FREE INSIDE – YOUR COMPUTER COURSE PART 4

Your COMPUTER

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▶ JUNE 1986 VOL. 6 NO. 6

BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE

AMSTRAD–
The shape of things to come?

DR LOGO
BEYOND TURTLE GRAPHICS

LOW COST PC CLONE ON TEST



FOUR PAGE ADVENTURE SPECIAL

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BUYERS' GUIDE TO WORDPROCESSORS

HINTS & TIPS ★ SOFT FILE ★ CLUBS ★ NEWS ★ SOFTWARE PREVIEWS

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Carrods Graphic Design, Cambridge





Software designed in conjunction with Sinclair Research

Draw straight on to your screen!

The Spectrum Doodler is a lightpen that enables you to draw straight on to your own tv or monitor screen. Pen reaction is instant and requires no programming knowledge. Software is displayed on 'pull-down' menus with icon symbols so that you can easily select the feature you require by simply pressing the pen against the screen.

16 colour palette with flashing option!

Using a palette of sixteen colours you can choose the line thickness most suitable for your work.

14 options including text!

Besides line thickness, there are modes to enable you to create instant squares, circles and triangles. You can fill in areas with colour textures, repeat stock patterns or make your own design using a special layout grid. Draw free hand – point to point or continuous line ribboning. There is also the facility to add text to your design.

Store your work on cassette or microdrive!



The Doodler Software allows you to save complete or incomplete pictures for rework or for use with your own programs at a later date.

Auto trim feature!

The pen has a trim feature that automatically sets the pen's accuracy to the tv or monitor screen you are using.

Robustly made, fun to use!

The lightpen is robust and comes complete with software on cassette which can be duplicated on to microdrive cassette. There is an instruction manual that's simple and easy to understand and an interface box for connection to your Spectrum computer. You can even write your own software for the Doodler if you wish.

To get your own Spectrum Doodler just send a cheque or postal order for £29.90 with the completed coupon. Free post and packing in UK only.

I enclose a cheque/postal order for £ ________ (includes P+P) for my Spectrum Doodler(s). Allow 28 days for delivery. Full refund if not completely satisfied.

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Address ____________________

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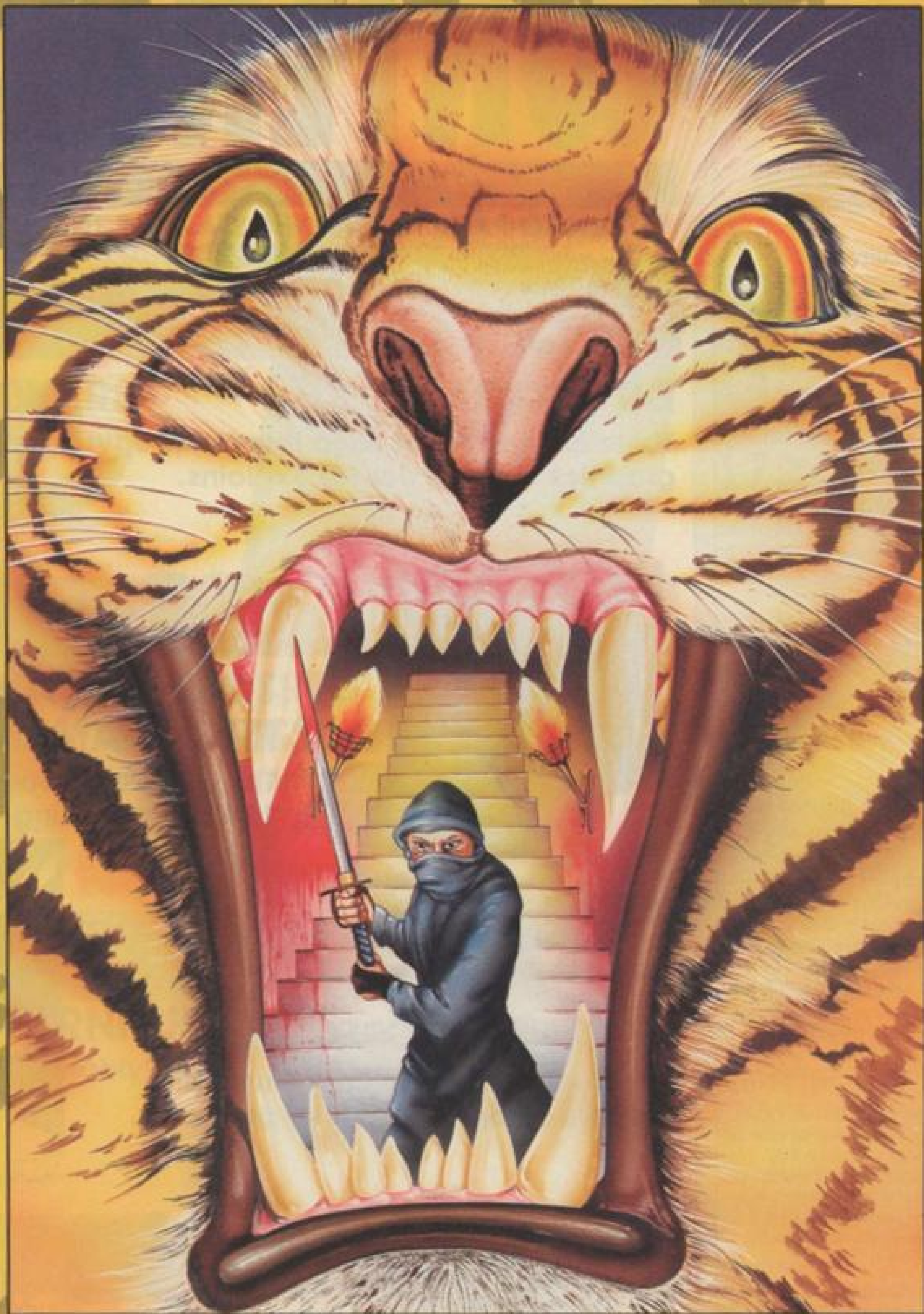
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Please state whether 128K or 48K.

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SPECTRUM Doodler LIGHTPEN

THE WAY OF THE TIGER



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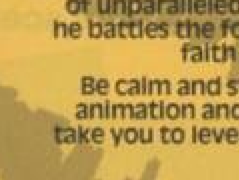
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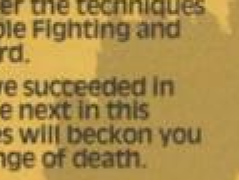
MSX 64K Spectrum 48K Amstrad CBM 64/128

Gremlin Graphics Software Limited, Alpha House, 10 Carver Street, Sheffield S1 4FS. Tel: 0742-753423





TRIPLE-SCROLL





Screenshots from Spectrum 48K

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...he likely shape of the Amstrad/Sinclair ...s on pages 14 and 50.









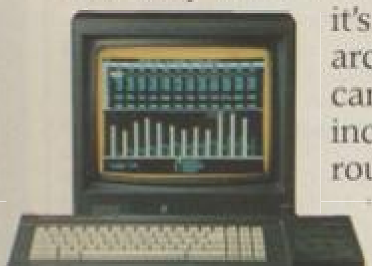


It does accounts, projections,



No wonder people are racing out to buy Amstrad's new CPC 6128 computer.

Not only does it answer all your business needs, it's also compatible with nearly 200 arcade and adventure games. So it can either speed you through your income tax returns or whizz you round a simulated Silverstone.



On the business side we start you off with a free disc which introduces you to the Amstrad CPC 6128's impressive range of capabilities, and the best ways to exploit them.

You'll discover how its massive 128k memory can open the door to over 8,000 CP/M* applications.



Programs like 'Wordprocessing' and 'Database' will file and index records, produce standard letters, mailing lists and even compile reports.



There's a series of business control programs which form a complete invoice, stock control and statement system.

In other words it's easy to choose the software you need to take the big *problems* out of your small business.



But even if you don't own a business there are plenty of good reasons for owning an Amstrad CPC 6128.

It makes short work of the problems we all face. Like keeping track of rates, mortgage and H.P. payments.

However even software packages as comprehensive

AVAILABLE AT ALLDERS · BOOTS · BRIDGERS · CLYDESDALE · COMET · CURRYS · DIXONS · GRANADA · GREENS · LASKYS · JOHN LEWIS ·

, wordprocessing and 180mph.



as Amstrad's are only as good as the hardware they're loaded into.

You need a complete system.

That's why the Amstrad comes complete with a built-in disc drive as well as a monitor (green screen or full colour). So it's ready to go to work as soon as you get it home.

And if you want to go further additional disc drives, printers and joysticks are all available to ensure that your computer can grow with your growing needs.

Finally there's one feature of the Amstrad CPC 6128 that's both good business and a pleasure: the price.

With Green Screen around	£299
With Colour Monitor around	£399



YC/6128/4

Tell me more about the Amstrad CPC 6128

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Address____________________

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ATARI ST

Power Without The Price!

FREE SOFTWARE

When you buy one of the new Atari ST computers from Silica Shop, you will receive a large and varied software package free of charge. This package covers several applications and comprises a total of nine titles. All ST's now have TOS/GEM on ROM, and the total list of free software is as follows:

1) GEM - *DR Desktop environment with WIMP (in ROM)*
2) TOS - *Tramiel Operating System (in ROM)*
3) 1st WORD - *Word Processor by GST using the GEM environment and multiple windows*
4) BASIC - *Personal Basic by DR (with manual)*
5) LOGO - *Logo language by DR (with manual)*
6) DOODLE - *Simple paint/doodle drawing package (works on mono or colour systems)*
7) MEGAROIDS - *Asteroids type game by Megamax*
8) NEOCHROME - *A powerful colour paint and graphics package (only useable with colour systems)*
9) CP/M EMULATOR - *Allows the use of DR's Z80 C/PM software to run on any ST system*

3rd PARTY SUPPORT

The power and potential of the ST range of computers is causing a flood of new software titles, peripherals and accessories from third party manufacturers. Titles range from word processing to spreadsheet programs, from graphics and games to database management - all with those easy drop-down menus and windows. With the list of companies producing ST software including dozens of top names, you can expect some first class titles for the new ST range. The following includes a selection of the third party manufacturers who have developed, or are working on, products for the ST range:

ABACUS	EXTENDED S/W	MICRO-ED INC	ROBINSON SYS
ACADEMY	FIDELITY	MICROPRO	SCARBOROUGH
ACCOLADE	FIRST BYTE	MICROPROSE	SIERRA ON LINE
ACTIONSOFT	FIRST PUBNG	MICROPRO ENG	SM SOFTWARE
ACTIVISION	FLIP 'N' FILE	MIGRAPH INC	SOFTEK
ADVENTURE INT	GLENTOP PBNG	MILES COMP	SOFTLABS
ANTIC	GST SYSTEMS	MIRACLE	SOFTLOGIK
AMERICAN COVERS	HABA	MIRAGE	SOFTWARE COMS
ARTWORX	HAYDEN	MIRRORSOFT	SECS
ASHTON TATE	HIPPO	MONARCH DEV	SOFTWARE PUNCH
ATI	HISOFT	MOSAIC	SOFTWORKS
AUDIO LIGHT	INFOCOM	MULTIFORM	SORCIM/IUS
AZTEC	INSIGHT	MULTIMATE	SPINNAKER
BATTERIES INC	INSOFT	OCEAN	SST SYSTEMS
BAYVIEW	ISLAND LOGIC	ODIN	STONEWARE
BECKEMEYER	KNOWLEDGWARE	OMNITREND	SUBLOGIC
BETTER WORKING	KUMA	OSS	SUNDATA SERVICES
BLUE CHIP	LASERSOFT	OTHER VALLEY	SUNSHINE BOOKS
BOS	LEHRNER	OXXI	SUPPLEMENTAL
CASHLINK	LEVEL 9	PAPERLOGIC	SYSTEMATICS
CHANG LABS	LIONHEART	PARADOX	TALENT
CHELTEK SYST	LLAMASOFT	PENGUIN	TDI
CHIPSOFT	LONGMINSTER	PHILON	TELARIUM
COMPUTE!	MAINTHINK CORP	PLANNER	TK COMPUTER PRO
CROSSBOW MUSIC	MAP COMPUTERS	PLANTIR	TOP EXPRESS
DATABENCH	MARK of UNICORN	PROGRESSIVE	TOWNGATE
DATACODE SYS	MARK WILLIAMS	PROSPERO	TYNESOFT
DATA SYSTEMS	MARTIN CONSU	PRYORITY	UNISON
DELTRON	McGRAW HILL	PSION	VIP
DILITHIUM PRESS	MEGAMAX	PSYGNOSIS	WASON MICROCHIP
DRAGON GROUP	MEMOREX	QUICKVIEW SYS	WHITENDALE
DUFOSE PUBNG	METACOMCO	RAINBIRD	WINDHAM CLASSICS
ELECTRONIC ARTS	MICHTRON	REGENT	WORD of GOD COM
EXECON	MICRODEAL	RISING STAR	XLENT

520ST-M

NEW 512K 520ST-M KEYBOARD: The new 520ST-M keyboard costs only £346.96 (+VAT=£399) and is yet another price breakthrough for Atari Corporation. The keyboard now includes both an RF modulator and cable, allowing you to connect it to an ordinary domestic television set. In addition, the keyboard is supplied with 512K RAM, a mouse and a free set of 3½" disks containing applications software. The TOS operating system and the GEM graphics package are now supplied on 192K ROM chips which are already installed in the keyboard. This means that the operating system will automatically boot in when you switch the power on. In addition to the keyboard, you will also need to purchase either a ½Mbyte disk drive (RRP £130+VAT) or a 1Mbyte disk drive (RRP £174+VAT). Either disk drive will provide you with fast information retrieval and a vast amount of storage space. If you prefer not to use your own TV set, you may connect your ST to a monitor. You may purchase the Atari SM124 monochrome monitor (RRP £130+VAT), or one of Atari's two Thomson colour monitors. Alternatively, you may choose one of the many third party colour monitors which are available.

NEW 1024K 520ST-M+ KEYBOARD: In addition to the standard 520ST-M, we have a new keyboard which we are calling the Atari 520ST-M+. The M+ is a 520ST-M keyboard which has been enhanced by a third party RAM upgrade to 1 megabyte of memory. The 520ST-M+ is available from Silica at a retail price of only £433.91 (+VAT=£499). This product will provide you with an alternative to the 1040ST-F, but at a lower price. Additionally, it features the advantage of the 520ST-M's built in modulator.

£347

1040ST-F

For the businessman and the more serious home user, Atari have introduced the 1040ST-F, a low cost powerhouse which can be introduced to a business environment as a stand-alone system, or can support a mainframe computer as a terminal. The new one megabyte 1040ST-F enhances Atari's 'value for money' reputation in the marketplace as it is the first personal computer available with one megabyte of memory for less than £800. You can purchase the 1040ST-F as a monochrome or colour system. The price of the monochrome system is £799 (+VAT = £918.85), with the colour system at only £999 (+VAT = £1148.85). The new 1040ST-F not only features twice as much memory as the 520ST-M, but also includes a one megabyte double sided disk drive and mains transformer, both built into the console to give a compact and stylish unit with only one mains lead. The 1040ST-F is also supplied with a free software package. Unlike the 520ST-M, the 1040ST-F was manufactured solely with business use in mind and as such is supplied with a monitor. It does not include the RF modulator or lead. We now have stock of the 1040ST-F at all four branches of Silica Shop. Call into your nearest branch for a demonstration.

1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX
117 Orpington High Street, Orpington, Kent, BR6 0LG
Lion House (1st floor), 227 Tottenham Court Rd, London, W1
Selfridges (1st floor), Oxford Street, London, W1A 1AB

£799

THE ATARI EXPLOSION!

If you read the specialist computer press, you will have noticed that there is one company which is getting a large slice of editorial space at the moment, that company is Atari Corporation. Atari have been making the news since the launch of their new 16/32 bit range of ST computers. Led by the powerful figure of Jack Tramiel and under the banner 'Power Without The Price', Atari are manufacturing new computers at unheard of prices, with the power to challenge firmly established market leaders. With the introduction of IBM compatibility, a CP/M emulator, a powerful networking system and a communications package for their new low cost powerhouses, it doesn't look as if it will be long before there is an explosion of the magnitude which will see Atari placed firmly besides such names as IBM and Olivetti in the personal computer marketplace. Read on for more details of what Atari are doing, and how they are putting their 'Power Without The Price' computers beyond the reach of the competition.

FREE CP/M EMULATOR

This newly annouced CP/M Emulation Package, will enable software written under Digital Research's Z80 CP/M operating system to be run on the ST family of computers. There are several thousand applications written for CP/M in the UK alone, and several of the major CP/M software development houses may convert their programs to 3½" disk format for the ST range. The CP/M emulation package is supplied FREE OF CHARGE by Silica Shop with all ST computers.

IBM COMPATIBILITY

To make the ST available to those businesses who currently run IBM systems and are looking for a low cost expansion method, Atari have announced a co-processing unit for ST computers. This processor will open the ST range to all IBM or IBM compatible software applications. The unit, which attaches to the ST computers via the DMA (Direct Memory Access) port, contains an Intel 8088 processor with 512K of RAM and will accept a 5¼" disk drive. In it's ST mode, the unit will also act as a second disk drive, offering the user an additional 500K of memory. The IBM co-processing unit should be available in late Summer 1986. If you would like to be informed when it is released, please complete and return the coupon below. We will send you further details as soon as we have them.

20Mbyte HARD DISK £739

The new Atari hard disk for the ST range has just been released. All ST computers already have a hard disk interface built into them so there is no external interface required. The memory size of the disk is a massive 20 megabytes (unformatted) with a data transfer rate of 1.33 Mbytes per second. At a price of £739 (+VAT=£849), the 5¼" hard disk offers massive storage with fast access at a very reasonable price.

NEW ST SOFTWARE PACKAGES

There are now hundreds of software packages which have been announced for the Atari ST range. Titles available now include DB Man, a DBase 3 clone as well as H & D Base, a DBase 2 clone. In addition, PC Intercomm is a VT100 emulator which enables you to use any ST keyboard as a terminal connected to a mainframe or mini. Other programs include a Lotus 1-2-3 clone (see paragraph below).

VIP PROFESSIONAL - LOTUS 1-2-3™ CLONE

This is probably the most impressive program to have been released so far for the ST range. VIP Professional is an extremely easy to use, integrated spreadsheet, database and graphics program which is identical both in features and commands to Lotus 1-2-3™. The same spreadsheet analysis, information management and extraordinary business graphics are all combined in one easy to learn, affordable package. What's more, VIP Professional not only has all the features of 1-2-3™, you can also type the same commands to do the same things. Probably the most surprising feature of VIP Professional is not its total compatibility with Lotus 1-2-3™, nor its ease of use, but its price. Lotus 1-2-3™ for the IBM PC/AT costs £395 (+VAT=£454.25), whereas VIP Professional for the ST is a mere £169 (+VAT=£194.35). That's less than half the price! If you would like further details, of VIP Professional, please return the coupon below.

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ATARI

WE ARE THE UK's No1 ATARI SPECIALISTS

At Silica we have been successfully dedicated to Atari ever since their products first appeared on the UK market. We can attribute our success largely to the Atari specialisation which we practice and to the user back-up we provide. Rest assured that when you buy a piece of Atari hardware at Silica you will be fully supported. Our mailings giving news of software releases and developments will keep you up to date with the Atari market and our technical support team and sales staff are at the end of the telephone line to deal with your problems and supply your every need. With our specialist bias, we aim to keep stocks of all the available Atari hardware, software, peripherals and accessories. We also stock a wide range of Atari dedicated books and through us, the owners on our list can subscribe to several American Atari dedicated magazines. We can provide a full service to all Atari owners and are now firmly established as the UK's NUMBER ONE Atari specialists. Here are just some of the things we can offer to our customers.

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ON THE NEW RANGE OF ATARI ST COMPUTERS

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Address: ....

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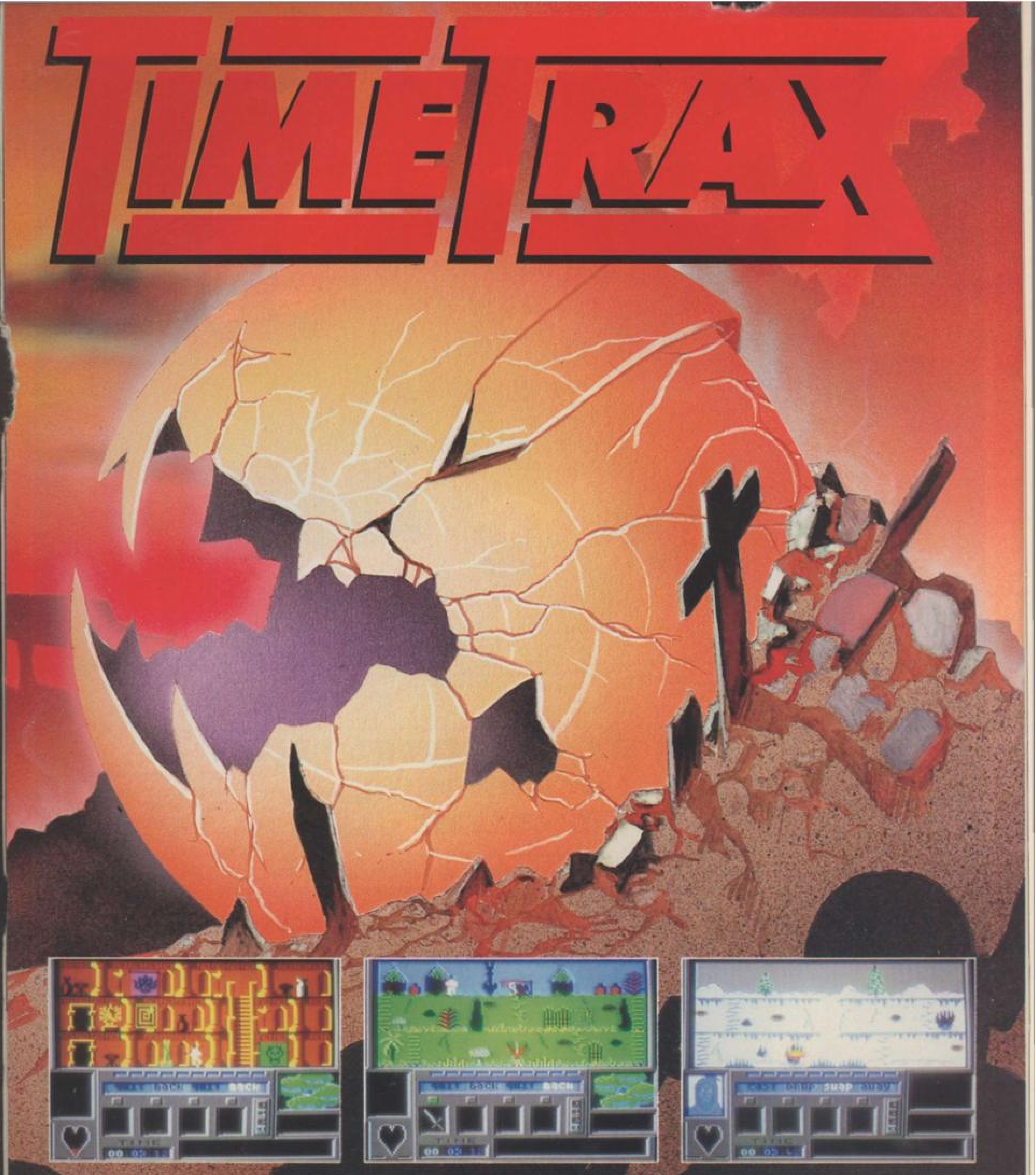
....

Postcode: ....

Do you already own a computer
If so, which one do you own? ....



48K SPECTRUM		COMMODORE 64	
PITFALL II	ACTIVISION	PITFALL II	ACTIVISION
PSYTRON	BEYOND	SPACE PILOT 2	ANIROG
FALL GUY	ELITE	PSYTRON	BEYOND
AD ASTRA	GARGOYLE	FALL GUY	ELITE
SAM STOAT SAFEBREAKER	GREMLIN GRAPHICS	DEMONS OF TOPAZ	FIREBIRD
SPLAT	INCENTIVE	SHEEP IN SPACE	LLAMASOFT
MUGSY	MELBOURNE HOUSE	KONG STRIKES BACK	OCEAN
KONG STRIKES BACK	OCEAN	BLACK THUNDER	QUICKSILVA
CHEQUERED FLAG	PSION	DEATH STAR INTERCEPTOR	SYSTEM 3
BLUE MAX	U.S. GOLD	TALLADEGA	U.S. GOLD


TIMETRAX

COMMENT

Amstrad did not wait long before it began to take an active role in marketing the Sinclair range of computers. The ink on the agreement transferring control of the home computer side of Sir Clive Sinclair's company to Alan Sugar's organisation can scarcely have been dry when a £40 reduction in the price of the Spectrum 128K computer was announced.

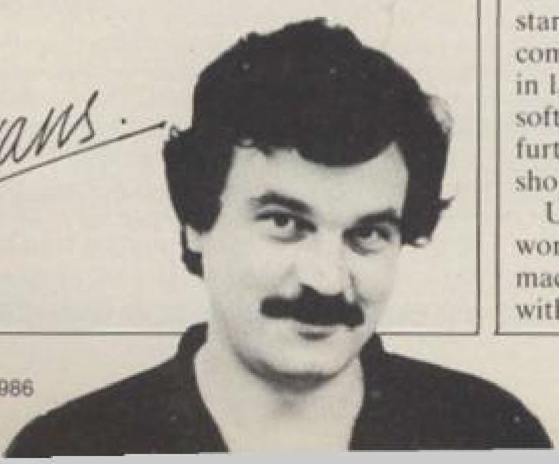
That and other indicators would tend to suggest that the aim of Amstrad is to shift existing stocks of the three machines which formed the Sinclair product line – Spectrum Plus, Spectrum 128K and QL – before launching a re-designed, re-packaged computer in time for the Christmas market.

In view of the fact that it is Sugar's stated intention to improve dramatically the reputation Sinclair computers have for quality, it is likely that machines launched under a combined Sinclair/Amstrad badge will be the subject of a complete re-design. That is because, for whatever reason, the existing Sinclair designs seem unable to achieve an acceptable level of reliability in the field.

Our front cover this month shows an artist's impression of a possible Amstrad/Sinclair computer based on comments made by Sugar and on speculation in the trade. Outwardly, the machine owes a good deal to the Amstrad CPC464; the electronics inside the case are likely to owe more to a typical Amstrad machine than to the existing Spectrum PCB. Such a machine would be at the bottom of any future product range; a computer with a built-in 3in. disc drive, a la CPC6128, would be at the top of the range. Both computers would offer compatibility with previous Spectrum software.

In the next few months there will be a confirmation of the plans Amstrad has for the Sinclair Spectrum name. Certainly we can expect to see a new design before the autumn. In the meantime, for a look at Sinclair, present and past rather than future, turn to our Sinclair supplement for a round-up of all the best in hardware and software for the Spectrum computer.

Gary Evans.



Personality Profile – Bill Gates

Once upon a time in Seattle, Washington – about 11 years ago, to be precise – there lived a young man – well, he was almost 21 – who devised a version of the computer language called Basic for a dinosaurian computer called the Altair. While the Altair never got very far, except as a footnote to the history of microcomputing, the man who designed its Basic, Bill Gates, went on to co-found a little outfit now known as Microsoft, one of the biggest microcomputer software houses in the world.

About seven years after his first Basic, Gates began to think very hard about what the then-booming home computer market needed to make writing software much easier. As the business computing industry was standardising round the IBM PC – and the MS-DOS operating system which Gates' company had written for it – and plenty of software was resulting from that standardisation, Gates thought the same process should happen in the home market.

He soon found a conglomerate of major Japanese manufacturers who agreed with him and the plans for the MSX computers were born. The idea behind MSX was simple – establish a hardware and software standard which many major companies support, sell them in large quantities, and software, peripherals and further third-party support should follow.

Unfortunately, it did not work that way. The MSX machines reached the market with little software, were technically unimpressive and found themselves priced highly in a very volatile market which changed from week to week.

Although only a moderate number of machines were sold, many Japanese companies still support the MSX standard and have release MSX II and MSX III machines in the last six months. Support for MSX was put further into question last month, however, when Gates stated in this exclusive interview with Geof Wheelwright that Microsoft was withdrawing from the venture and would no longer be involved.

His announcement was tinged with a hint of sadness, as it was clear that Gates had wanted MSX to succeed, probably because it had made such pure and simple sense when it was first conceived.

John Shirley, president of Microsoft and the man who runs the company alongside Gates, said the move was really in response to changes in the home market over the past two years – not because they did not believe in the original design. MSX machines will still be sold and Microsoft will still receive royalties on whatever machines are sold but, as Shirley says, "the home market does not really seem to be there."

That statement is perhaps ironic from a company whose sales have consistently been boosted by its *Flight Simulator* game for the IBM PC and for the massive number of Basic programming language licences it has sold for home computers in the last five years.

Hacker Trial – Gold & Schifreen found guilty

The successful prosecution of two computer hackers, Robert Schifreen and Stephen Gold, by British Telecom will leave its mark in legal history. It was the first time anyone in the U.K. was charged and convicted in relation to offences involving unauthorised access to remote computers. The way in which prosecution evidence was obtained will also be the subject of controversy for some time and suggests there may be hi-tech future digital surveillance by telephone lines, at present without Home Office control.

Gold and Schifreen were charged with nine counts of forgery, the gist of which goes "making a false instrument, namely a device on or in which information is recorded or stored by electronic means, with the intention of using it to induce a computer to accept it as genuine and so by reason of accepting it to do an act to the prejudice of the owners or operators of that computer".

Each count refered to unauthorised access of a particular Prestel computer, including a development test computer and Vampire, a Prestel status computer. The allegations pointed to the forged instrument being a floppy disc. The actions were alleged to have been to the prejudice of British Telecom.

Schifreen said he stumbled accidentally on a Prestel test ID while testing some BBC micro terminal software. By choosing all 2s plus 1234 as an ID and password, he explained that he gained access unexpectedly to an account in the name of G. Reynolds.

That ID proved to be a vital key in accessing all the other Prestel computers and eventually gaining top-level system manager control capability and access to all subscribers' and information providers' confidential details such as IDs and passwords. Restricted access information appeared to have been shared with Gold, who used it to access Prestel computers without official authority.

To gather prosecution evidence, BT used telephone call loggers and data monitors attached to the telephone lines of both defendants before they were arrested and charged. The defence did not raise legal objections to those surveillance actions, which laymen might have had difficulty in distinguishing from telephone tapping or bugging, an action which requires the issue of a warrant by the Home Secretary. Apparently no such warrant is necessary when surveying digital data down the telephone as opposed to voice communication – for the time being, at least.

The call loggers recorded the occurrence of Prestel telephone numbers dialled by the defendants, while the data monitors captured digital information exclusively, i.e., Prestel frames, all for later re-examination as evidence. The court was subjected to various items of computer hardware to relay the evidence to judge, jury and counsel, in camera.

The prosecution alleged that several Prestel accounts had been used without proper authorisation and gave evidence indicating that accounts had been abused, by either or both defendants. Genuine holders of those accounts were called as witnesses.

Gold and Schifreen, in defence, pointed to their previous good character and that no malicious intentions had been contemplated. The defence pointed out the ease with which access was obtained to restricted areas of Prestel, alleging a slack and cavalier attitude to security, Schifreen saying that he discovered an important ID and password on the welcome frame of one of the Prestel test computers.

Both Gold, the impresario behind Micromouse on Micronet, and Schifreen, writer of the Bughunter column in *Computer and Video Games* magazine, protested their innocence from the outset. Both admitted some instances of unauthorised access to Prestel computers and the Southwark Crown Court jury eventually decided that the evidence of BT was sufficient for guilty verdicts on all counts, though returning majority rather than unanimous verdicts on several counts.

Judge Butler QC said: "Forgery is a very serious offence. It will usually lead to a sentence of imprisonment" but he imposed "lenient" fines of £150 on each count due to the "extraordinary nature" of the case and ordered each defendant to pay £1,000 towards the prosecution costs. Gold's fines totalled £1,600 and Schifreen's £1,750 added to the £4,000 forfeited to legal aid fees. Both intimated that they would appeal.

Redwood Publishing Ltd and Chris Curry

On page 24 of our May issue, we published an article headed "Ariola is flying high" in which we described Ariola's new offices as being "formerly occupied by Redwood Publishing, Chris Curry's ill-fated enterprise".

In fact, Redwood Publishing is trading successfully and has for that reason moved to substantial new premises in Drury Lane. We were therefore wrong to describe the business as "ill-fated". Redwood Publishing's magazine *Acorn User* continues to be published and widely-read. We apologise to Redwood Publishing and Chris Curry for the error in our report.

Low cost modems launched

The cost of communicating is becoming cheaper and, despite the convictions in the 'Hackers' case last month, it is also becoming easier to find legally-approved modems and comms packages which are worth using.

Last month there was approval for both the Voyager and Magic modems, which have for some time been sold with the infamous 'you can buy but not use' BT red badge on the bottom. Both modems now bear their official green approval labels and still are relatively inexpensive.

The Voyager and Magic modems are each in two versions, a basic model for £79.95 and a full-featured offering for £99.95. The Voyager 7 and Magic standard modems are the cheaper comms options, while the Voyager 11 and Magic Professional represent the more complete modems.

There was also news of cheap modems from Dowty Information Systems, which now has a range of such devices starting at only £96. The cheapest model, the Minimo 300 offers manual dial, manual answer and asynchronous communication operating at 300 baud (V21) and full duplex. For another £100 with the Minimo plus 1 you get auto-answer, manual dial and operation at V21 and V23.

The latest rash of BABT approvals on modems should enhance the competition significantly among modem manufacturers and make communicating an even cheaper option.

The availability of comms software and RS232 add-ons for machines like the Amstrad PCW8256/8512 should add to the competition.

This chart is based on the MicroScope chart as compiled by Gallup.

MicroScope GALLUP

MicroScope is the weekly trade paper of the microcomputer industry. If your computer store doesn't display the latest MicroScope chart, ask the manager to call Mark Salmon on 01-631 1433 — we'll send a copy every week.

AMSTRAD TOP 10

TM	LM	Title	Publisher
1	NE	Last V8	Mastertronic
2	NE	Into Oblivion	Mastertronic
3	8	Spindizzy	Electric Dreams
4	NE	Get Dexter	PSS
5	5	Way Of The Tiger	Gremlin Graphics
6	NE	They Sold (2)	Hit Squad
7	9	Compendium Hits 10 Vol 2	Beau Jolly
8	3	Formula One Simulator	Mastertronic
9	NE	Commando	Elite
10	NE	Turbo Esprit	Durell

TOP 30 OVERALL CHART

LM	TM	Title	Publisher
1	26	Bomb Jack	Elite
2	3	Commando	Elite
3	NE	V	Ocean
4	17	Green Beret	Imagine
5	4	Formula One Simulator	Mastertronic
6	7	Way Of The Tiger	Gremlin Graphics
7	23	Last V8	Mastertronic
8	19	Comp. Hits 10 Vol 2	Beau Jolly
9	NE	They Sold (2)	Hit Squad
10	5	One Man And His Droid	Mastertronic
11	10	Superbowl	Ocean
12	NE	Spellbound	Mastertronic
13	14	Finders Keepers	Mastertronic
14	NE	Turbo Esprit	Durell
15	12	Action Biker	Mastertronic
16	NE	Spindizzy	Electric Dreams
17	NE	Starstrike 2	Realtime
18	NE	Batman	Ocean
19	2	Yie Ar Kung Fu	Imagine
20	NE	Off The Hook	Off The Hook
21	6	FA Cup Football	Virgin
22	22	BMX Racers	Mastertronic
23	NE	Heavy On The Magik	Gargoyle Games
24	16	Mr Puniverse	Mastertronic
25	24	Incredible Shrinking Fireman	Mastertronic
26	NE	Cyberun	Ultimate
27	28	Winter Olympics	Tynesoft
28	NE	Sport Of Kings	Mastertronic
29	NE	Rockman	Mastertronic
30	15	Ping Pong	Imagine

COMMODORE TOP 10

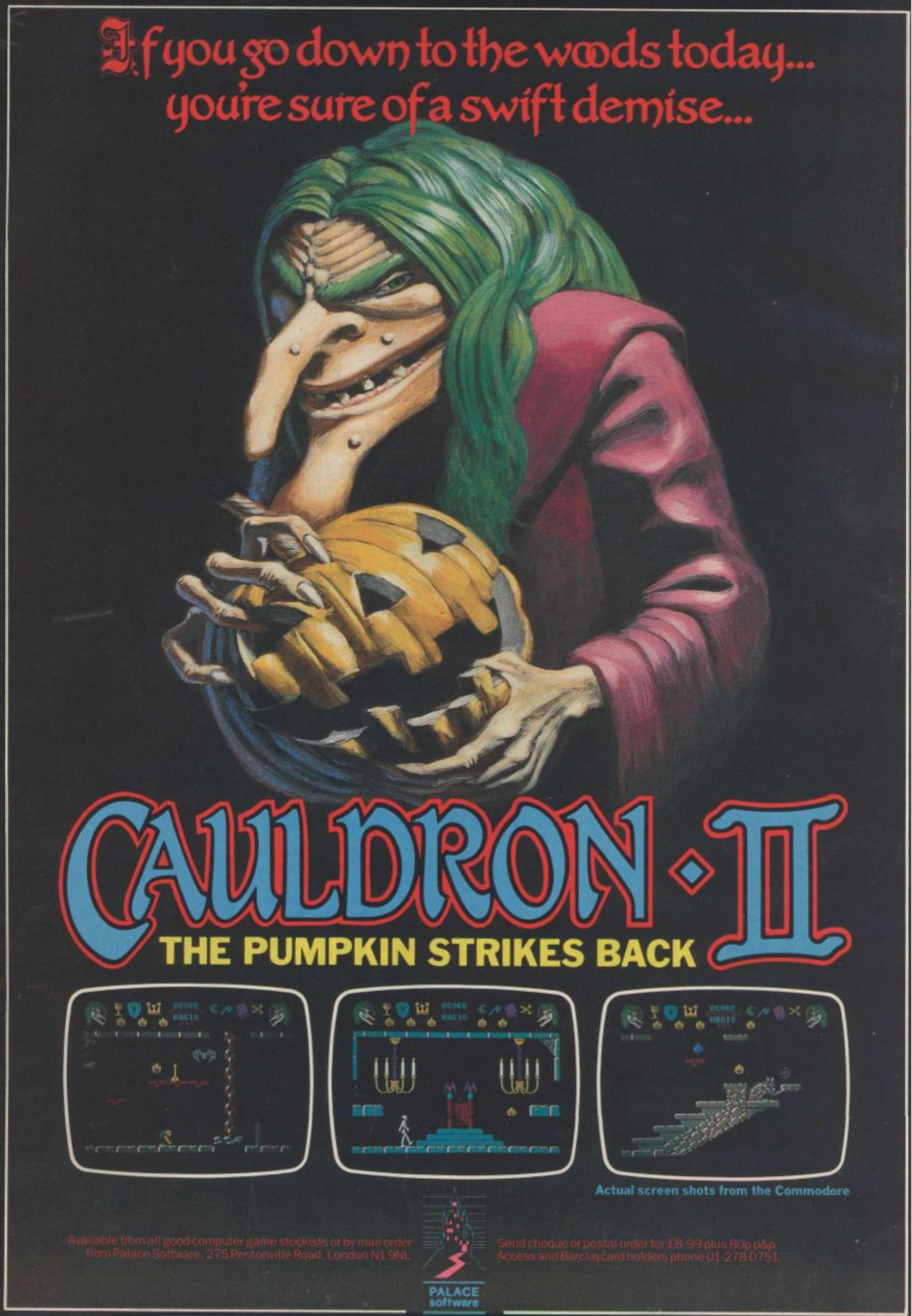
TM	LM	Title	Publisher
1	NE	Bomb Jack	Elite
2	NE	V	Ocean
3	1	Uridium	Hewson Consultants
4	NE	Thrust	Firebird
5	NE	PSI-5 Trading Company	US Gold
6	4	Superbowl	Ocean
7	NE	They Sold (2)	Hit Squad
8	8	Kane	Mastertronic
9	NE	Off The Hook	Off The Hook
10	NE	Zapp Sizzlers	Gremlin Graphics

SPECTRUM TOP 10

TM	LM	Title	Publisher
1	2	Green Beret	Imagine
2	7	Bomb Jack	Elite
3	NE	V	Ocean
4	1	Way Of The Tiger	Gremlin Graphics
5	NE	Starstrike 2	Realtime
6	NE	Heavy On The Magik	Gargoyle Games
7	6	Incredible Shrinking Fireman	Mastertronic
8	NE	Batman	Ocean
9	NE	Cyberun	Ultimate
10	8	Turbo Esprit	Durell

BUBBLING UNDER

Title	Publisher
Thrust	Firebird
Samantha Fox Strip Poker	Martech
PSI-5 Trading Company	US Gold
Alien Highway	Vortex
Wing Commander	Mastertronic
Sky Ranger	Mastertronic
Get Dexter	PSS
Countdown To Meltdown	Mastertronic
Esunder	Gremlin Graphics
International Karate	System 3


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Chris Grey, author of Infiltrator.

Infiltrator – big in the States

Chris Grey, author of the cult hit *Boulderdash,* has a new game on the way, *Infiltrator.* It has been a big success in the States and is number one in Sweden. U.S. Gold should have it available in the U.K. by the end of summer on a number of machines.

The game is a big departure from the abstract Boulderdash and its follow-up, *Rockford's Riot.* It combines features of a simulator with an arcade adventure and has an original plot line.

According to Grey it is meant to be a fairly light-hearted game. There are three missions, to photograph some documents, blow up a radar, and rescue a scientist – a breed which needs rescuing almost as frequently as princesses. You start in a helicopter which has all the controls of a simulator, with rockets, flares and cannon. It also has a radio which you can use to talk to the enemy. By that method you can try to bluff your way past enemy helicopters which will challenge you.

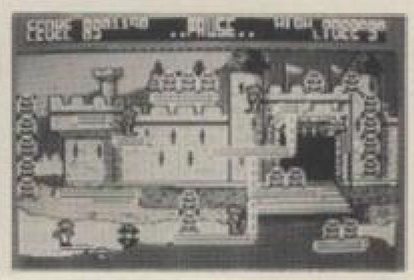
After that section you have to leave the comparative safety of your chopper and complete the mission on foot.

Sounds like a Bomb

Bombjack, the Elite arcade hit, has been converted for the Amstrad. The game has also spawned a clone, *Bombo,* on the CBM64 from Alligata.

While the Alligata version has slightly weaker graphics and game play, it has a superb soundtrack from Ben Dalglish. It costs £7.95 on tape, or £9.95 on disc and is available on the Alligata Rhino label.

Bombo.



The Logic analyser on IQ

Oasis Software, author of the highly-acclaimed *White Lightning* and *Laser Basic* has produced another highly-professional software development package, *Laser Genius,* available for Amstrad, Spectrum and Commodore. It is an assembler-monitor package, featuring an exceptional logic analyser.

The program will be available from Ocean on its IQ label. Disc versions will cost £19.95 and on cassette it is Ocean claims the program has many exceptional features but the one it is stressing above all others, is the logic analyser.

The theory is that this piece of software emulates a job which normally needed complex and expensive hardware to achieve. Not only can the execution of an assembled program be stopped by a normal breakpoint but, you can also stop the program if a series of logical conditions are satisfied.

For instance, if you had a bug where a program was over-writing itself or ruining your graphics screen, you could get the program to stop whenever a write instruction was found which altered memory within a certain range of addresses.

Ocean hopes the program will tempt the first-time user as it claims that the language feels a lot like Basic, with line numbers and direct commands. Spectrum 128 owners can expect a version in the near future with plenty of extra features.

Dreams of Tempest on Amstrad

Tempest addicts with an Amstrad could be deserting the arcades in droves when they see the official Activision version, due this month on the Electric Dreams label.

With keyboard or joystick option, the game features all the speed, sound and colour of the original. There are 99 screens, each featuring a different shape of chasm. All the usual aliens are there, and you have plenty of your trusty super zappers. You even get the music to Entrance of the Queen of Sheba playing in the background. At the moment its not clear whether there will be conversions but owners of other machines should not despair. Activision has *Mermaid Madness* planned.

According to a spokesman, the game-s exceptional feature is that it will have the first-ever nude fat person to star in a computer game – truly a major leap forward. Myrtle, the portly mermaid must rescue Gormless Gordon, the diver, who has managed to become trapped. An arcade adventure, it features an underwater wreck and a submerged city.

On your bike – On your Spectrum

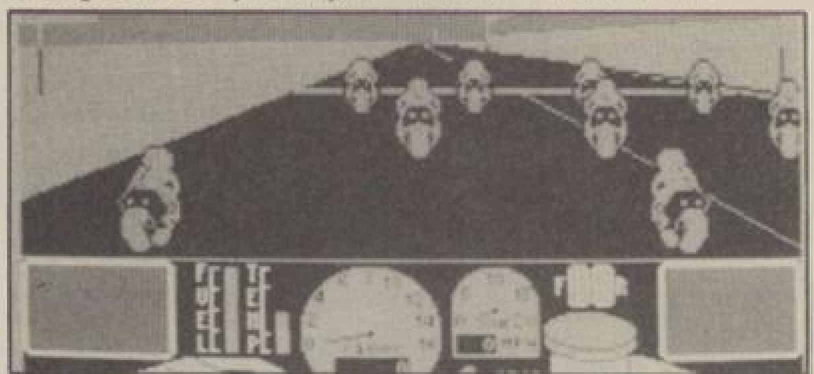
T.T. Racer, the long-awaited motor cycle racing program from Digital Integration, is on the grid and ready to go. Written for the Spectrum, it will do for bike fans what *Revs* did for the car fraternity. It is unlike any bike game which has preceeded it and will have people hanging on to their seats as the whole screen sways as you lean into the corner.

Rod Swift, who has spent over 18 months on the project, explained: "I wanted to make it look like this" as he switched on a video made from the a camera strapped to the petrol tank of a 500c.c. Suzuki. Then he turned back to the computer game and one would see what he means.

Much of the development time was spent up blind alleys. Finally, Swift opted for a fairly simple solid-fill technique so that the speed could be maintained even when going flat out with all the opposition on the screen. You can choose from four levels of opposition with a random element, so that the opposition bikes will not always finish in the same order.

Another thing that strikes one about *T.T. Racer* is the playability. All controls are on the joystick and the angle of lean is self-centring only at small angles, so it is possible to lean into the corners and stay there but also to be vertical in the straights. If you fall, you will not finish in a heap of tangled limbs – you will just lose a little time re-mounting. The opposition bikes are also programmed to try to avoid crashing into you, unless you do something suicidal.

There will be a complete Grand Prix season, with all 12 tracks. You will even be able to change the set-up of the bike to suit the track.



Swift's partner, Dave Marshall, is already busy at work on a new simulator, to follow the success of *Tomahawk.* "I will obviously use many of the techniques developed in Tomahawk, like the wire frame enemy aircraft. It will be back to a fixed wing machine this time," he says. Let us hope its not another 18-month wait.

Swift, on the other hand, is to take a well-earned rest after T.T. Racer. "I think I will go back and do a nice easy shoot-'em-up, like *Night Gunner,"* he says.

Digital also plans to diversify into business software on the PCW8256. There are more conversions of Tomahawk and T.T. Racer to follow. Tomahawk will appear on the Commodore and an Amstrad version of T.T. Racer, which will feature much more colour, is planned, but not for the Commodore as, according to Swift, the graphics are too slow.

Sheep in Space only different

Iridis Alpha, the new game from Jeff Minter, is due this month or next. Minter describes the game as "like *Sheep in Space,* only different." Instead of your character floating in the voide between the surfaces of two planets, you have two planetary surfaces back to back. You can switch between the top and bottom surface. Your character can crawl along the surface, crab-like; it can leap and fly.

In a departure from his recent games, the robot character you control bears no resemblance to sheep, llamas or other large furry animals. The object is to collect energy from the planet's surface and deliver it to the de-activation system. The game bears a superficial resemblance at times to *Marble Madness* and *Batalyx* but with plenty of original game play and noisy blasting.

Llamasoft is also planning the release of its classic shoot-'em-up *Gridrunner* on the C16. Minter claims it is even better than the CBM64 version. If it is, it will be one no owner will want to miss.

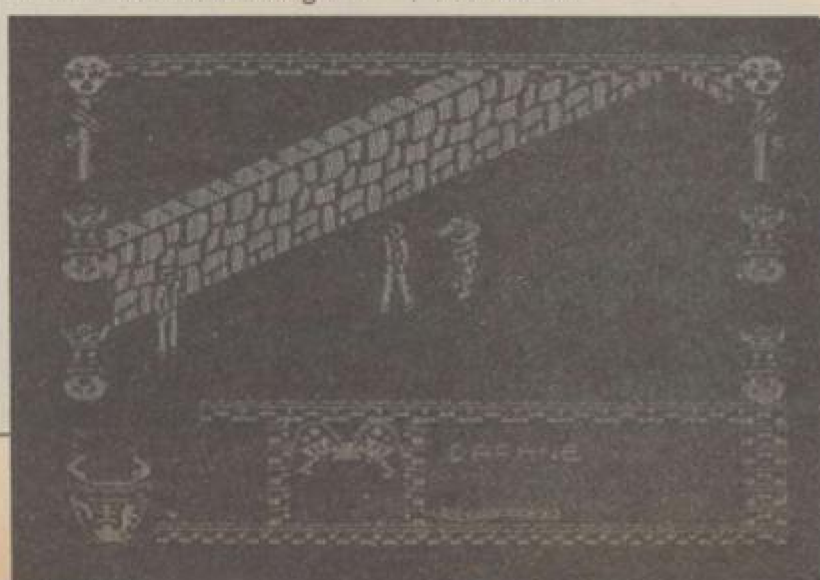
Pyracurse 3D Arcade Adventure

Pyracurse, due at the end of June has Hewson Consultants deserting the arcade style of its recent hits, *Uridium* and *Quazatron,* and harking back to its earlier games, *Avalon* and *Dragontorc.*

The game is a 3D arcade adventure featuring our hero Legless O'Donnell, peerless reporter for the Daily Excess. Although it resembles the Steve Evans games, *Pyracurse* is from two Hewson backroom boys, Mark Goodall and Keith Prosser.

Legless must save the delicate Daphne Pemberton-Smythe from the evil curse of the South American god, Xipe Totec, as they try to find what happened to Daphne's father. The game also stars archaeologist Professor Rodger Kile, and a dog called Frozbie.

It uses a multi-dimensional scrolling system developed specially for the game. It covers an area the equivalent of several hundred screens spread over three or four levels. Monsters include a headless guardian and a rather large Scorpion. You can control the four characters in turn. Each has strengths and weaknesses. If one is killed, one of the others must try and revive it. The game will cost £9.95.



OPEN MONDAY-SATURDAY 9 AM-6 PM

Micronet Ban non-approved modems

Micronet has taken the unprecedented step of revising its attitude towards the advertisement of non-approved modems on its pages. Publisher Simon D'Arcy confirmed that, as from April 15, no modems or associated equipment requiring but not currently awarded. BABT approval can be mentioned in advertisements carried by the Micronet.

There are several popular but unapproved modems on the market, including the Demon Modem, Miracle Multimodem (C64) and the Watford Le Modem.

The somewhat bureaucratic process required for modems to be BABT approved, often involving delays of five or six months, has been the subject of much unfriendly discussion, especially among smaller modem manufacturers and suppliers.

One modem supplier issued a spoof press release declaring its new modem was approved for use by the Inter Galactic Federation.

There was great controversy when some modems were seen with green BABT lookalike Galactic Federation stickers.

It seems that controversy may have prompted Micronet to clarify its advertising policy. It remains to be seem whether BABT, under some pressure from Oftel process times.

TANDATA HELP IN MARATHON

The Tandem computer which helped co-ordinate the London Marathon this year was linked to Prestel via a Gateway interface. That meant that Prestel users could keep track of the 23,000 entrants and results processed by the Tandem.

Apparently the system had difficulties at one point, as impostor competitors in the over-subscriubed event wore fake competition numbers featuring nonsensical bar code numbers.

Organiser on-line

The recently-launched Psion Organiser II pocket computer, complete with its powerful procedure-based programming language, will be able to connect to any standard RS232 modem at 1,200 baud. Database Publications, which runs the Microlink service on BT Gold, is already talking about supporting the Organiser as an ideal mailbox collection device and even envisaging connecting full auto-dial and answer modems via the optional RS232 adapter.

The CM Model Organiser II costs £99.50 and the RS232 adapter £47.95. Link adapters, e.g., 25-pin D type to 5-pin BBC RS423 domino DIN plug, are available for £12.95. Now all we need is pocket-sized modems.

BABT at last

In the wake of the Micronet clamp-down on advertising of BABT approvale products, Kirk Automation announced that, after almost six months of waiting, two modems it manufacturers, the Datastar Magic Modem and the Modem House Voyager 7, have been issued BABT approval numbers.

New QL Modem

Commpak Data, which launched the never-to-be-produced Brightstar modem for the Sinclair QL last year, has announced a new QL modem, the Astrocom 1000. It is totally software-controlled, featuring full auto dial/answer, Hayes compatability, and a 6K printer buffer.

Terminal software, as with the Brightstar, is written by Ken Smith and features full colour viewdata handling, plus an 80-column scrolling text terminal.

Keith Webb of Commpak Data says the modem will sell for £198.95 and will probably be on sale this month. He says BABT approval will take up to five months.

With news that a new QL-based micro from David Tebby, designer of the Sinclair QL, is on the horizon, it appears the Astrocom 1000 may have a bright future.

Spectrum 128 VTX 5000 available

Despite rumours of a new modem being developed by originators of the successful OEL VTX5000 modem for the Spectrum, Modem House is claiming that it will be the first with a Spectrum 128 modem to sell. The package will consist of a plug-in cartridge designed to allow a Voyager 7 modem to be connected. A cartridge will cost £39.95 and the Voyager 7 modem £79.95. Unfortunately the system will be able only to download telesoftware files up to a maximum of 32K in length.

The old VTX5000 modem, which has a monopoly of the Spectrum 48K modem market, does not work satisfactorily on the Spectrum 128.

Internal Master Comms soon

Two companies are working on internal modems for the BBC Master. Pace, maker of the popular but ageing Nightingale modem, and Modem House are both working hard to bring the frist Master Modem to the market.

The BBC Master has an on-board slot designed specifically for modems to be connected and as the internal modem connects directly into the Master processor bus, the useful RS423 port remains free for other applications.

It seems that the Modem House device will be a modified version of the Voyager 7 modem board with suitably-modified software from Soft Machinery, which wrote the software which drives the Acorn Prestel Adaptor.

Pace will have a completely new design coupled with a modified version of its latest Commstar terminal package. Both rival modems will offer full auto answer/dial and multi-baud rates.

Martyn Gilbert of Acorn, hardware designer for the BBC Master series, seems confident that approval would not pose problems for either manufacturer and rival micros, such as the Apricot PC range, which make use of BABT-approved plug-in modems. From experience, problems seem likely to occur somewhere though.

Putting the turtle in its place

Owners of any Amstrad CPC or PCW personal computers using discs under CP/M have the added bonus of a free copy of Dr Logo. Logo is a much-talked-about language, promoted as an excellent introduction to computing and as a possible future replacement for Basic. That makes it all the more irritating that the Amstrad manual provides nothing more than a reference-style summary of Dr Logo and not a particularly useful one at that. As a result, most Amstrad users to whom I have talked tend to regard their free software as free but useless.

Not so. As this short series of articles will demonstrate, Dr Logo is useful and great fun. So if you are disenchanted with Basic, dust off the Dr Logo disc which arrived with your machine and read on. If you are not an Amstrad user but have access to a version of Logo running on another machine, you should still find something to interest you but you might have to modify parts of the program listings to take account of any use of Amstrad-specific graphics or sound.

The best-known feature of Logo is its turtle graphics. For that reason turtle graphics and high-resolution graphics in general will be left to the end of this series. The basic idea of turtle graphics – controlling a graphics pen in the guise of a turtle using commands such as 'forward 10, left 90' – is a useful way of introducing programming but it has tended to be an over-emphasised aspect of Logo.

It has reached the stage where some versions of Logo are nothing more than turtle graphics packages and while turtle graphics are very much part of Logo, LOGO > TURTLE GRAPHICS. Unfortunately, Dr Logo is a good and fairly full implementation of Logo. It includes the ability to do a wide range of arithmetic, character-handling recursion and, most important, list processing.

Logo is a language related to the artificial intelligence language Lisp and in the first part of this series it is this side of the Logo personality which will be examined in detail. That may sound complicated but if you know a little Basic it will be plain sailing.

There are two versions of Dr Logo – version 1 for CP/M 2.2 systems, as run on the CPC464 and CPC664, and version 2 for CP/M plus as run on the CPC6128 and the PCW 8256/8512. Version 2 contains a number of extra functions and commands which make it easier to use but most of those functions can be added to Version 2 with no great difficulty. For the purposes of this article we will use Version 2 and then show how to make the program run under Version 1 by the addition of the missing functions.

Getting Logo running is simplicity itself. After placing a CP/M system disc in the drive, type SUBMIT LOGO3 – or SUBMIT LOGO2 if you are using CP/M 2.2. If everything works satisfactorily, and there is no reason why it should not, you will see Logo announce itself and then a ? will appear on the screen. That question mark is the Logo signal that it is ready for you to type commands. If you type a command such as ct, standing for clear text screen, followed by the usual RETURN, the command will be obeyed at once, i.e., the screen will be cleared.

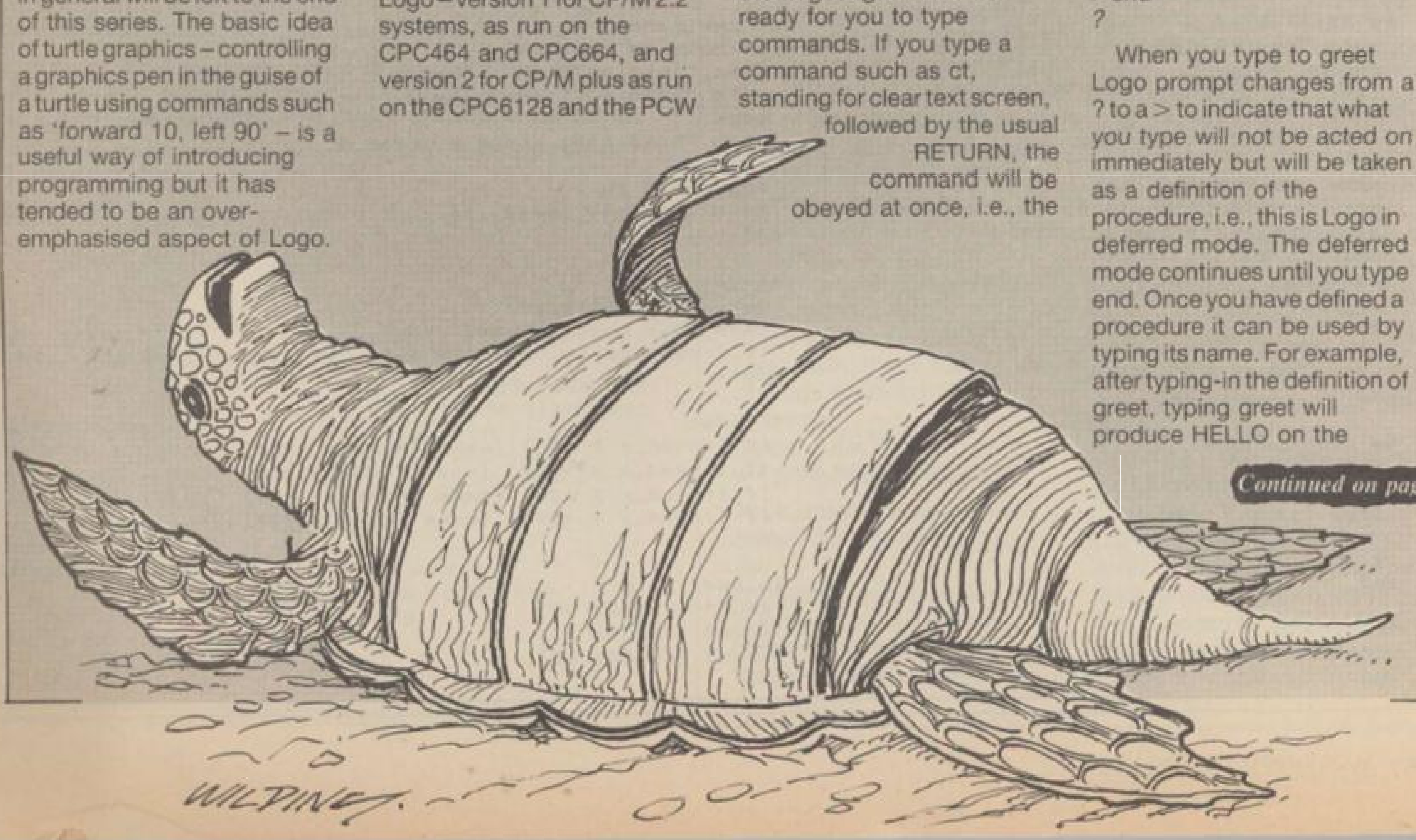
That is Logo's immediate mode of operation, i.e., a command will be obeyed immediately. Logo is often introduced using immediate commands to control the movement of a turtle and hence to draw on the screen. This is a good way to introduce the ideas of programming but it is not really programming. The difficulty with doing something with a list of immediate commands is that once the machine has obeyed them you have to type them in again if you want to repeat the task.

All programming languages provide some method of keeping lists of instructions in memory so that they can be obeyed without having to type them back in again. In Logo, lists of instructions are grouped and saved as 'named procedures'. For example, the Logo command to print something on the screen is pr and pr "HELLO will print HELLO on the screen – notice that unlike Basic you do not need the final ". If you want to print HELLO on the screen often, it makes sense to define this action as a procedure. There are a number of ways to define a procedure but the simplest is to type:

```
?to greet
> pr "HELLO
>end
?
```

When you type to greet Logo prompt changes from a ? to a > to indicate that what you type will not be acted on immediately but will be taken as a definition of the procedure, i.e., this is Logo in deferred mode. The deferred mode continues until you type end. Once you have defined a procedure it can be used by typing its name. For example, after typing-in the definition of greet, typing greet will produce HELLO on the

Continued on page 26



Continued from page 25

screen. Notice that a procedure, once defined, will stay in the machine memory until you switch off, leave Logo or explicitly delete the procedure using the er procedure name command. For example, to get rid of the greet procedure you would type er greet.

Programming in Logo is all a matter of building a single procedure which does what you want. To do that in one effort would be very difficult and so most Logo programs are written using extensive references to other procedures which, in turn, use other procedures and so on. That corresponds to the technique of top-down modular programming used to simplify the writing of large programs in other languages such as Basic. This use of procedures which use procedures and so on can be seen in the listing of the example program for this month.

It is very difficult to type a procedure without making mistakes and any sensible version of Logo has to provide an editing facility. In Dr Logo, typing ed "procedure name loads the procedure definition into an editing buffer where you can use the cursor keys and the delete key to make any changes necessary. When you have finished editing you can either press the ESC key, which will abandon the contents of the edit buffer without making changes to the procedures defined in memory, or you can press the COPY key which transfers the contents of the edit buffer into Logo workspace as if you had typed it on the keyboard.

Notice that this means that you cannot get rid of a procedure by deleting every line of it from the editing buffer, because when you press COPY nothing is transferred from the edit buffer to the workspace and so the original version of the procedure remains unchanged. It also means that if you change the name of the procedure it will be added to the existing procedures. It is important to remember that what you see in the editing buffer is only a possible definition of a procedure you may choose to add to the workspace by pressing COPY.

There are a number of other useful commands which let you see your program as it develops. The command pots – standing for print-out titles – will give a list of all the procedures currently defined and po "procedure name – standing for print-out – will list the named procedure without entering edit mode. Finally, you can save a program by typing save "filename and load a program by typing load "filename. Once again, loading a file merely adds the procedure definitions stored on disc to the ones already in memory; Logo hangs on to everything unless you tell it to do otherwise.

You can use variables in Logo to store a surprisingly large range of data types. For example, to store a number in a variable type make "variable name value as in make "pi 3.14159. That is a rather long-winded way of assigning a value to a variable when compared to the Basic equivalent of PI=3.14159 or even LET PI=3.14156 but, as will become clear, it is very logical. As well as assigning values, Logo will work out the value of any expression before storing it in a variable. For example, make "area

Snake program

```
to snake
 initialise
 print_snake
 label "loop
  update
  animate
 if not (:cl = 0) [go "dead] []
  buzz
 go "loop
 label "dead
 splat
end

to initialise
 make "sp [[0 0]]
 repeat 14
 [make "x (item 1 first :sp) - 10
  make "xy list :x 0
  make "sp fput :xy :sp
 ]
 make "sv [10 0]
 make "v [[0 10] [-10 0] [0 -10] [10 0]]
 make "key [240 254 242 250]
 make "c 4
 make "ex 1
 recycle
 fs
 cs
 ht
end

to print_snake
 make "i 1
 repeat 15
 [seg item :i :sp 1
  make "i :i + 1
 ]
end

to update
 if keyp [get_key] []
end

to animate
 blank_tail
 new_head
end

to blank_tail
 if (:ex = 4)
 [make "ex 1]
 [make "ex :ex + 1
  make "tail first :sp
  make "sp bf :sp
 ]
 seg :tail 0
end

to new_head
 make "head last :sp
 make "head_x (item 1 :head) + (item 1 :sv)
 make "head_y (item 2 :head) + (item 2 :sv)
 edge
 make "head list :head_x :head_y
 col
 seg :head 1
 make "sp lput :head :sp
end

to get_key
 make "asc ascii rc
 make "cur memberp :asc :key
 if (:cur) [make "c where make "sv item :c :v] []
end

to edge
 if (:head_x > 310) [make "head_x -320] []
 if (:head_x < -320) [make "head_x 310] []
 if (:head_y > 190) [make "head_y -200] []
 if (:head_y < -200) [make "head_y 190] []
end

to buzz
 sound [2 1500 20]
 sound [7 1500 1]
 sound [2 1800 20]
end
```

DR LOGO

3.14*10*10 will store 314 in area. If you want to include a variable in an expression you have to follow the convention that :variable name refers to the value stored in the variable, that is :radius is the value stored in the variable radius.

The use of a colon to signify 'value in' is a little pedantic but it makes sense once you know the way Logo treats its other basic type of data, the word. A word is a collection of letters, symbols or digits delimited by spaces. Thus a radius is two words a and radius but a_radius is one word. Words can mean a variety of different things in Logo depending on exactly how they are used. If you use a word without embellishment, it is assumed to be the name of a procedure; if you preface it with a colon it is assumed to be a reference to the value stored in a variable of that name; and if it is preceded by a single " it is taken to be a literal, i.e., a type of data in its own right and the Logo equivalent of a Basic string. Thus:

pr area	*tries to print the result of a procedure called area*
pr :area	*tries to print the contents of the variable called area*
pr "area	*prints the characters area on the screen*

One of the most difficult things to get correct in using Logo is what character should precede a word in any given situation. Sometimes you can work it out by the sense; for example, pr :pi*:radius is clearly correct, as it is the values stored in pi and radius which have to be multiplied. On the other hand, sometimes you have to know only the correct usage; for example, the name of the variable being assigned to in a make command has to be preceded by ". That is make area 100 and make :area 100 are both incorrect; it has to be make "area 100. In retrospect, you can see that has some sense in it but it can scarcely be called obvious.

The most powerful type of data Logo offers is the list. A list is more or less what you would expect – a list of items enclosed by square brackets. The items which comprise a list can be any type of data – including lists. It is the possibility of building lists within lists which makes Logo a powerful language. Examples of lists are [This is a list of words], [1 2 3 4 5 6] and [[1 2] [3 4] [5 6]]. The last example is a list of lists each consisting of a pair of numbers and that type of list plays an important role in this month's example.

Any variable can be used to store a list or a list of lists. For example, make "sen [this is a list] stores a list in the variable sen.

As well as the types of data a language can use you also need to know the ways in which you can alter the flow of control, i.e., determine which instruction will be obeyed next. Logo has only three ways of altering the flow of control. The repeat command can be used to form an enumeration loop – the equivalent for a FOR loop in Basic; the if statement can be used to select between one of two alternatives; and the go instruction can be used in combination with the if statement to form a conditional loop. The repeat command has the form:

repeat number of times [list of instructions]

which will repeat the list of Logo instructions the number of times specified. For example:

repeat 5 [pr "Hello]

will print HELLO five times.

The if statement has the form:

if (condition) [true list] [false list]

and, as you might expect, the true list of instructions is obeyed if condition is true and the false list otherwise. For example:

if (:a=0) [pr "a is zero] [pr "a is non-zero]

The form of the conditional loop we use is to a certain extent controversial in that is uses the Logo equivalent of the Basic GOTO instruction rather than recursion. You can see an example of it in the snake procedure in this month's example but because it is controversial we will devote more space to a discussion of it next month.

The basic principle behind animating a snake is simple enough; each time through the animation cycle you print the head at its new position and blank-out the old position of the tail. The program listed will animate a simple snake drawn in high-resolution graphics. The program is written to run under Dr Logo Version 2; if you want to run it under Version 1 you have to add the extra procedures indicated.

The program makes extensive use of lists and lists of lists. In particular, the position of each segment of the snake is stored as a list [x y] and that results in the position of every segment of the snake being stored as a list of lists in the variable sp. The position of the tail is the first pair of co-ordinates and the head the last pair.

Updating is done by adding new head co-ordinates to the end of the list and removing tail co-ordinates from the start of the list. The version of the game as listed detects only when the snake collides with itself. It is easy to include collision detection for other objects scattered about the screen but Logo runs so slowly – particularly the version which runs under CP/M 2.2 – that it is not really worth the extra effort.

That is not a reflection of the qualities of Logo as a language. If you compare this snake program to a similar one written in Basic – see *Working Graphics on the Amstrad CPC464 and 664* by Mike James, Kay Ewbank and S. M. Gee published by Argus books – you will find the Logo version is much simpler and more direct.

```
to col
 if (memberp :head :sp) [make "cl 1] [make "cl 0]
end

to splat
 sound [2 179 20 12]
 sound [7 179 1]
 sound [2 190 20 12]
 sound [7 190 1]
 sound [2 201 20 12]
 sound [7 201 1]
 sound [2 213 20 12]
 sound [7 213 1]
 sound [2 225 50 12]
end

to seg :st :pen_col
 setpc :pen_col
 pu
 setpos :st
 pd
 seth 90
 repeat 4 [fd 6 rt 90]
end

Procedures for CP/M 2.2 version of Dr Logo ONLY

NOTE:  In  version  one of Logo, indenting and
formatting are not supported. In particular repeats
and ifs must be entered  without embedded RETURNs.

For example, the repeat loop in print_snake has
to be entered as -

  repeat 15 [seg item :i :sp 1  make "i :i + 1 ]

to last :lst
 op item count :lst :lst
end

to memberp :slst :tlst
 make "i 1
 make "fnd (1 = 0)
 repeat count :tlst
 [if (:slst = item :i :tlst)
  [make "fnd (1 = 1)
   make "position :i
  ]
  []
  make "i :i + 1
 ]
 op :fnd
end

to lput :add :str
 make "ladd list :add []
 make "str bl se
      :str :ladd

  op :str
end

 to where
  op :position
 end
```

Pull-down Menus and Skeletons

By Richard Sargent

With the Spectrum now owned by Amstrad and nobody answering the telephones at Sinclair Research, we find the search for truth – 128 style – is like shooting the rapids on the uncharted reaches of the Amazon.

This month we look at the Spectrum screen-storage capacity, its competence with a light-pen, and its ability to speak to an Epson parallel printer. Those three aspects of the 128 are brought together by a menu program, written in Basic, which gives the computer a primary screen and nine other screen overlays or pull-down menus.

The main virtue of a pull-down menu is that it does not destroy what it covers. Remove the overlay and the next level down should still be intact. The Basic program, listing one, gives a hierarchical arrangement of screens which can be visualised as the tree structure of figure one. Screen 0 can be overlaid by screens 1,2 or 3, while Screen 1 can be overlaid by screens 4 and 5. 128 Basic can store only 10 Spectrum screens in its paged RAM or silicon disc but they need not necessarily be laid out in the manner shown in figure one – this format is fixed by the program and movement between the screen can be only in the direction of the arrows.

Light-pens

At the top of each screen are the menu-option titles and since there are never more than three options they can be selected easily by the keypresses 1, 2 or 3 or by pressing a light-pen in one of the three menu titles. The light-pen used in the program is the F E Electronics Doodler, which is very accurate. As it stands, the program shown is a skeleton, i.e., it allows the user to flip between one screen/menu and another, but each menu does nothing except announce the screen selected and wait for a user input to flip to another screen. Beautiful menu designs and multi-choice user input – i.e., a real program – must be added at suitable points throughout the skeleton.

Lines 20 – 30 of the program set the light-pen for optimum efficiency – the values of xtrim and ytrim will vary according to the television set or monitor you use and the Doodler documentation explains how to adjust those values. If you do not have a light-pen, ignore lines 20 – 30, lines 660 – 910 and replace line 970 with 970 LET m=0. Lines 40 – 110 set 10 demonstration screens and put them into the silicon disc using the SAVE! "name" SCREEN command.

Lines 120 – 650 constitute the skeleton program and consist of 10 blocks of code dealing with each screen. The code for each block performs a number of simple housekeeping tasks, as shown by the sample code below for screen s0:

```
15 LET n$="s0":LOAD! n$ SCREEN$               :  load the selected menu/screen.
16 LET n$="s0": LOAD! n$ SCREEN$              :  Code to do something, including
17 LET n$="s0": LOAD! n$ SCREEN$              :  altering the screen if needed.
25 LET m$=INKEY$:IF m$=""THEN GOTO 25         :  Wait for user input.
35 ERASE! n$                                  :  Create space in silicon disc.
45 SAVE! n$ SCREEN$                           :  Re-save the menu.
55 IF m$="1" THEN GOTO xxxx                   :  Branch to selected menu x.
65 IF m$="2" THEN GOTO yyyy                   :  Branch to selected menu y.
75 GOTO zzzz                                  :  Branch to selected menu z.
```

You will notice that when the program finally leaves the screen via line 35, it does two things. Line 45 saves the screen. That covers a situation in which the program at lines 16, 17 and so on makes changes to the screen which you wish to preserve. The new copy of the screen cannot be loaded directly into the silicon disc, since a screen of the same name is already there. Thus line 35 deletes the old version before saving the new version with line 45.

That, you will discover, takes some tenths-of-seconds, because after the old version is struck off the silicon disc directory, the remaining contents of the disc are re-arranged. True menus are never updated by a program, so you may like to remove the "ERASE/SAVE" routine. You will find them in each screen block in the program; for example, at line 240 GO SUB 1000 is the ERASE/SAVE routine for screen 1, so removing that line ensures that menu s1 remains the same at all times. For every GO SUB 1000 removed, the pull-down-menu system speeds perceptibly.

If you BREAK out of the program, you can either re-run it by typing GOTO 130 or you can wipe all the screens from the silicon disc using GOTO 1010 and then perform a normal RUN.

Inserting lines into a program on the Spectrum Plus is almost impossible, because existing lines cannot be renumbered. On the 128, pressing the EDIT key brings an Options panel on to the screen and by choosing the option RENUMBER the entire listing will be re-numbered in increments of 10 starting at line 10. Not much choice there, but at least it opens up a program and allows extra lines to be fitted in. Also on the EDIT panel is the word PRINT. A screen dump, perhaps? Not so. Selecting PRINT, which takes five keypresses, merely gives a printout of the program listing. You will probably be as puzzled as I am by this tremendous innovation, since typing LLIST<return> – six keypresses – also produces a printed list.

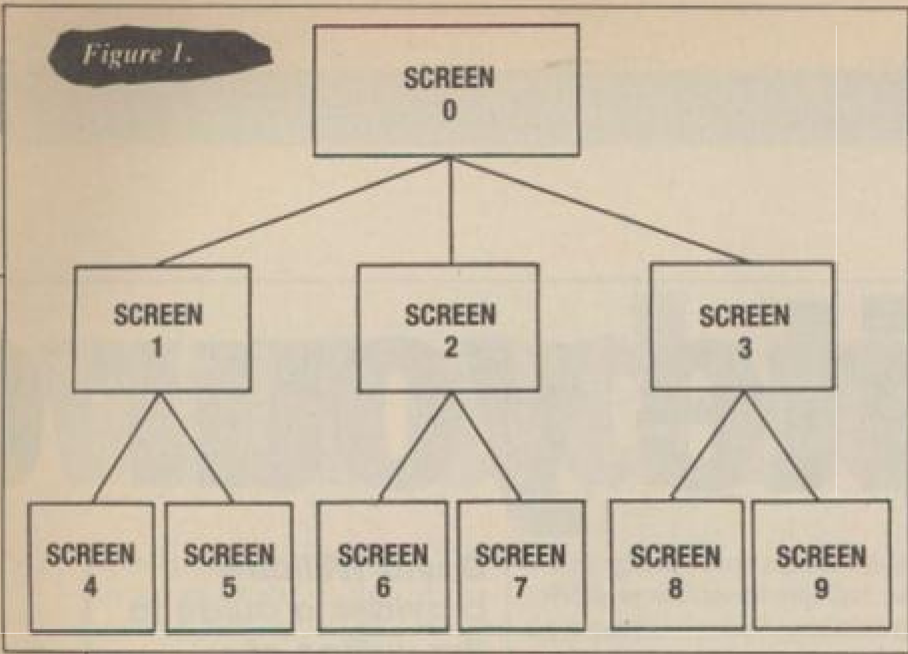
Last month, the Spectrum 128 was talking to a Brother EP44 thermal printer using a serial lead manufactured by Sinclair for the QL computer. This month I thought I would use the 128 on a dot matrix printer and so try the screen-image dump lurking in the 128 EDITOR ROM. My dot matrix printer is a parallel Epson RX80 and so a serial-to-parallel converting lead was needed to link computer and printer. Those leads translate the RS232 serial output of the 128 automatically into the 8-bit parallel signal required by the printer.

Baud rate

I used the QL Centronics interface marketed by RAM Electronics and it works well on the Spectrum 128, not only LLISTing programs but printing the enevitable LPRINT "Hello World" as well. The width of the printed document is altered by the command POKE 23396, <width> and is set at 50 columns at switch-on and after RESET. The 128 RS232 baud rate does not need to be altered to suit the RAM lead/RX80 combination – the default rate of 9,600 is used.

Incidentally, there is a Basic command revealed in the 128 technical documentation which is supposed to alter the baud rate. It is FORMAT "P",

Figure 1.



<speed> but so far my 128 insists that FORMAT is an alien word and throws-up a syntax error. It might be interesting to surmise whether FORMAT is waiting for an Interface 1 to be fitted to the 128. Interface 1 has its own interpretation of FORMAT and its own version of RS232. Meanwhile, use a hard RESET to select 9,600 baud. At that juncture, I began to get annoyed.

LPRINT "Hello World" works because Hello World consists of ASCII text characters. LPRINT CHR$ (27); "E" does not work because symbol 27, which an Epson needs for 101 reasons, is not a text character – it is a control character. Attempting to send 27 via an LPRINT prompts the message 8 End of File. I do not believe that. A quick look at the technical documentation tells me there is an EDITOR ROM routine to send a character via RS232 and a different routine to send a token via RS232 – 27 is a control character, not a token, so that does not help. To add insult to injury Error 8 is listed in the manual as a Microdrive file-handling report and I do not have Microdrive in the office, let alone connected to the 128.

Things are becoming complicated. The EDITOR ROM is paged-in when the 128 Basic logo is on the screen but is paged-out when a program is running. Getting at routines in the EDITOR ROM could prove difficult. No matter, CHR$ (27) must go to an Epson printer if the printer is to produce an image of the screen and the Sinclair technical documentation states clearly that the 128 will do just that. The keyword COPY produces a black-and-white screen dump, virtually the same size as the image on my 12in. monitor and with no horizontal or vertical distortion but 128 screens never stay around very long unless you know how to stabilise them. Typing the word COPY will normally destroy the screen by calling-up EDITOR mode.

There are three ways to circumvent this problem. Screen dumps can be made by incorporating the word COPY in a program line or by issuing the direct command LOAD "filename" SCREEN$: COPY, or – and this is the proper way – protecting the screen from destruction by toggling the command SCREEN, which is found on the EDIT OPTION PANEL. Set it one way and you have a Spectrum Plus-type screen in which SCREEN$ pictures are not destroyed by direct commands, although a listing will gradually scroll them off the screen. Set it the other way and the usual 128 EDIT screen dominates and obliterates everything.

Unexplainable message

A piece of machine code and a call to the EDITOR ROM might send a 27 along the RS232 wires, since the Basic routine COPY clearly has no problems with that magic number. COPY resides at 12AH (298d) in the EDITOR ROM (ROM 0) and out of perversity I made the decision to call routine 298 from Basic to see how the system coped. If the call found ROM 0, I reasoned, the printer should put out a copy of the screen, whereas if the call found ROM 1, it would enter a ROM Token TABLE, which is not executable code.

The result of a directly-executed RANDOMISE USR 298 and a program line RANDOMISE USR 298 was the same – the unexplainable message C. Nonsense in Basic. No COPY, and no crash – RANDOMISE USR 298 crashes a Spectrum Plus, by the way. From there, things could only get worse. Send-a-character at 295d and Send-a-Token at 292d in ROM 0 both failed to transmit 27 successfully at machine code level. So we end this month's 128 session with a few Sinclair brain teasers. Next month, the 128 keypad is dissected – literally – and we look at 128 sound.

Problem 1: Why does 128 Basic refuse to do anything, even crash, after RANDOMIZE USR 298?

Problem 2: Why does selecting ROM 0 by machine code and then immediately issuing a CD 2A 01 bring up the SAVE prompt.

Problem 3: What method does the 128 use to send the escape character 27 to a printer on RS232?

Problem 4: Will Amstrad produce a real manual for the Spectrum 128?

Listing 1.

```
10 BORDER 4
20 LET xtrim=152: LET ytrim=57
30 LET xac=2: LET yac=2
40 RESTORE
50 FOR s=0 TO 9
60 READ a,b,c
70 CLS : PRINT PAPER 6;"SCREEN ";a;" ";
   PAPER 7;" "; PAPER 6;" SCREEN ";b;" ";
   PAPER 7;" ";.PAPER 6;" SCREEN ";c;" ";
   PAPER 7;" "
80 PRINT : PRINT "This is screen"
90 FOR f=1 TO 64: PRINT CHR$ (48+s);:
   NEXT f
100 LET n$="s"+STR$ s: SAVE !
   n$SCREEN$ : NEXT s
110 DATA 1,2,3,0,4,5,0,6,7,0,8,9,1,1,1,
   1,1,1,2,2,2,2,2,2,3,3,3,3,3,3
120 REM screen 0 section
130 LET n$="s0": LOAD ! n$SCREEN$
140 REM all code relating to this
   screen goes HERE
150 REM now attempt to exit this screen
160 GO SUB 970: IF m=0 THEN GO TO 160
170 GO SUB 1000
180 IF m=1 THEN GO TO 220
190 IF m=2 THEN GO TO 290
200 GO TO 360
210 REM screen 1 section
220 LET n$="s1": LOAD ! n$SCREEN$
230 GO SUB 970: IF m=0 THEN GO TO 230
240 GO SUB 1000
250 IF m=1 THEN GO TO 130
260 IF m=2 THEN GO TO 430
270 GO TO 470
280 REM screen 2 section
290 LET n$="s2": LOAD ! n$SCREEN$
300 GO SUB 970: IF m=0 THEN GO TO 300
310 GO SUB 1000
320 IF m=1 THEN GO TO 130
330 IF m=2 THEN GO TO 510
340 GO TO 550
350 REM screen 3 section
360 LET n$="s3": LOAD ! n$SCREEN$
370 GO SUB 970: IF m=0 THEN GO TO 370
380 GO SUB 1000
390 IF m=1 THEN GO TO 130
400 IF m=2 THEN GO TO 590
410 GO TO 630
420 REM screen 4 section
430 LET n$="s4": LOAD ! n$SCREEN$
440 GO SUB 970: IF m=0 THEN GO TO 440
450 GO SUB 1000: GO TO 220
460 REM screen 5 section
470 LET n$="s5": LOAD ! n$SCREEN$
480 GO SUB 970: IF m=0 THEN GO TO 480
490 GO SUB 1000: GO TO 450
500 REM screen 6 section
510 LET n$="s6": LOAD ! n$SCREEN$
520 GO SUB 970: IF m=0 THEN GO TO 520
530 GO SUB 1000: GO TO 290
540 REM screen 7 section
550 LET n$="s7": LOAD ! n$SCREEN$
560 GO SUB 970: IF m=0 THEN GO TO 560
570 GO TO 530
580 REM screen 8 section
590 LET n$="s8": LOAD ! n$SCREEN$
600 GO SUB 970: IF m=0 THEN GO TO 600
610 GO SUB 1000: GO TO 360
620 REM screen 9 section
630 LET n$="s9": LOAD ! n$SCREEN$
640 GO SUB 970: IF m=0 THEN GO TO 640
650 GO TO 610
660 REM start of light pen code
670 LET sy=IN 127
680 LET switch=sy>128
690 LET yin=(sy-(switch*128))*2
700 LET y=(ytrim+175)-yin
710 LET xin=IN 191: LET x=(xin*2)-xtrim
720 RETURN
730 REM set flag if target----
740 GO SUB 670
750 LET xtarg=76: LET ytarg=172
760 GO SUB 850
770 IF switch+flag=2 THEN LET m=1: RETURN
780 LET xtarg=162: LET ytarg=172
790 GO SUB 850
800 IF switch+flag=2 THEN LET m=2: RETURN
810 LET xtarg=252: LET ytarg=172
820 GO SUB 850
830 IF switch+flag=2 THEN LET m=3: RETURN
840 LET m=0: RETURN
850 LET flag=0
860 IF x<(xtarg-xac) THEN RETURN
870 IF x>(xtarg+xac) THEN RETURN
880 IF y<(ytarg-yac) THEN RETURN
890 IF y>(ytarg+yac) THEN RETURN
900 LET flag=1: RETURN
910 REM end of light pen code
920 LET m$=INKEY$
930 IF m$="1" THEN LET m=1: RETURN
940 IF m$="2" THEN LET m=2: RETURN
950 IF m$="3" THEN LET m=3: RETURN
960 LET mm=0: RETURN
970 GO SUB 740
980 GO SUB 920
990 LET m=m+mm: RETURN
1000 ERASE ! n$: SAVE ! n$SCREEN$ : RETURN
1010 FOR s=0 TO 9
1020 LET n$="s"+STR$ s: ERASE ! n$: NEXT s
```

Write your

David Williams provides a guide to the writing of adventure games. The secret is to build each adventure around a shell system.

There are two ways to write an adventure game. The first is to write a program specifically around your adventure; the second to write a shell adventure system into which your adventure ideas can be slotted. The advantage of the first is that it can be written fairly easily but if you decide to write another adventure game all you can do is to start again from the beginning. Therefore we will opt for the second method, which will need only minor modifications if you want to change it.

An adventure game must have a purpose or an end goal to become a success. If the player wanders round for hours and cannot find anything to do, he will lose interest quickly and turn to other things. To keep the player interested, carrots must be dangled and chances given, so that after only a short time they become hooked. What preparation is needed? Answer these questions before turning on your computer.

Where is the adventure set? Draw a map of the location. Are the locations sufficiently varied? A good adventure will have deserts, caves, forests, underwater locations, castles and many more individual sections. An adventure game set entirely in a forest would quickly become boring. There are only so many ways you can describe a clump of trees.

Why is the player there? The player needs a reason for embarking on the journey; rescuing a princess, secret mission, great treasure are old favourites.

What does the player have to do to solve your adventure? Experiment with ideas for puzzles and jokes. Try to make sure the player will stay interested. Being killed every two moves becomes very tiresome. Try to make the problems at the beginning fairly simple and the ending more difficult.

Show your plot to a friend. If he thinks it is boring, ask if he has any ideas. Be selective, combining your ideas with those of your friend, keeping the plot fairly simple at this stage, to allow you to decide on the final details. Very few adventures are written by only one person.

Now what do I do? Start writing a list of all the locations with brief descriptions and exit routes, list of objects and their uses. Make sure you have only one of everything. Bottles and keys are easy to duplicate and cause problems. First, for you, as the program needs to be more complicated to differentiate and, second, the player will become confused and annoyed trying to fill the wrong bottle with water. Draw a very detailed map. Make sure the player cannot take a short cut past a problem or be stuck in exit-less mazes.

An adventure game program consists of four main sections. The parser, the portion which scans the player's input and tries to make some sense of the works; a command analyser, which checks to see if what the player is doing is allowed at that place as a result of his actions; and a database, which contains actions which are allowed, descriptions for objects and locations, and words understood by the

Listing 1 – Adventure Shell

```
10 REM Adventure Shell No 1
20 REM (c)    David Williams
30 REM For     YOUR COMPUTER
40 REM For various machines
50 :
60 REM Set up the word table
70 DIM WORD$(20)
80 FOR N=1 TO 20
90 READ WORD$(N)
100 NEXT
110 :
120 REM Set up location descriptions
130 DIM LOC$(7)
140 FOR N=1 TO 7
150 READ LOC$(N)
160 NEXT
170 LET LOC=1
180 :
190 REM Set up the exit table
200 DIM WHERE(7,8)
210 FOR N=1 TO 7
220 FOR X=1 TO 8
230 READ WHERE(N,X)
240 NEXT
250 NEXT
260 :
270 REM THE PARSER
280 CLS:REM OR WHATEVER YOUR MACHINE
    USES TO CLEAR SCREEN
290 PRINT"You are ";LOC$(LOC)
300 PRINT"What now?"
310 INPUT A$
320 GOSUB 370
330 GOTO 290
340 :
350 REM THE COMMAND ANALYSER
360 :
370 LET A=0
380 FOR N=1 TO 20
390 IF A$=WORD$(N) THEN A=N
400 NEXT
410 IF A=0 THEN PRINT"Sorry, I don't understand":RETURN
420 IF A<9 THEN GOSUB 460:RETURN
430 IF A=9  THEN END
440 PRINT"You try to ";WORD$(A):RETURN
450 :
460 REM Directions are sorted out here
470 REM 'A' holds the word number
480 NWLOC=WHERE(LOC,A)
490 IF NWLOC=0 THEN PRINT"You can't go that way":RETURN
500 PRINT"You go ";WORD$(A):LOC=NWLOC:RETURN
510 :
520 REM Vocabulary words
530 DATA NORTH,SOUTH,EAST,WEST,UP
540 DATA DOWN,IN,OUT,QUIT
550 DATA HELP,FILL,DRINK,TAKE
560 DATA LOOK,THROW,WAVE,DROP,KILL
570 DATA SWIM,JUMP
580 REM The locations
590 DATA in a clearing in the middle of a large forest.
600 DATA on top of a small hill south of a castle.
610 DATA lost in the forest.
620 DATA standing at the imposing gates of a castle.
630 DATA inside the Wizards castle.
640 DATA standing in a large treasure chamber. You have won!!!
650 DATA up a tall oak tree. You can see a clearing below you.
660 REM The directions
670 DATA 3,3,3,3,2,0,0,0
680 DATA 4,3,3,3,0,1,0,0
690 DATA 3,3,3,3,7,0,0,0
700 DATA 5,2,0,0,0,0,5,0
710 DATA 6,4,0,0,0,0,0,4
720 DATA 0,0,0,0,0,0,0,0
730 DATA 0,0,0,0,0,1,0,0
```

own adventure

parser. There are smaller sections which take care of the general housekeeping; filing routine handles saving and loading game positions; an event handler which controls whether it is light or dark, makes characters drop in on the player, and updates the score, to name a few.

Now turn on your computer and begin. The program listing is written in straightforward Basic. As a result, it will run on most machines with little or no modification. The only failing is that the powerful features of some computers will be unused.

The program prompts for a response and then passes the input to the parser. The first word is checked against the vocabulary list and, if no match is made, an appropriate response is given and we start again. If we reach line 420 a word match has been made and control is then passed to the command analyser.

When the parser has converted the player's input into numbers, the command analyser has to see whether the input is possible and allowed. If the input is direction, the subroutine at line 460 is called. If a verb is input, line 440 shows it has understood. If the input is QUIT, the program ENDs.

Should you have any difficulties, call The Adventure Helpline or leave a message on NBBS Clyde 041 880 7863.

Other programs are available in the Download section of the bulletin board. When logging-on, please include YC in your city so that the SYSOP will know you. One of the first 100 registrations will be given a free disc drive.

Get the Lamp Light the Lamp

Roger Garrett gives a guide to your first few steps on the adventure trail.

The most difficult decision a would-be adventurer has to make is whether the game being contemplated for buying is difficult or easy. To explain the difference is not simple – what is difficult to one player could be easy to another and the only way to define those games is, naturally, to play them. There are certain guidelines we can follow, whether by reading reviews or learning from friends or clubs, who are usually well-informed about such matters.

Making the initial decision, I feel, is important. It goes without saying that if novice adventurers buy the difficult game they will soon find themselves completely out of their depth and the game soon finishes on the shelf along with frustrated cries of "It's impossible" or "That's the last time I buy one of those" – and that will be a pity, because you will never experience the joy of exploring dark dismal caves, meeting strange aliens on some distant planet, helping Bilbo find the treasure of Smaug and all the other strange and weird events which can happen only in an adventure.

There is no such thing as an easy adventure. If there was, there would be no fun in playing the game. The difficulty is in the various types of problems posed by the writer, which can range from simple ideas, like finding a pole and using it to walk a tightrope, to very complex problems which can take hours to work out. I feel one thing which tends to deter people is when, on loading a game, they find themselves baffled immediately. It is the best of all deterrents and it is far better to be able to explore for a time and get a feel for the game and then tackle the various problems.

I also believe that having hundreds of locations is unnecessary. It is much better to have good atmospheric text descriptions and fewer locations than short, unimaginative descriptions and hundreds of uninteresting places to visit. Based on what I have outlined, I have selected 10 adventures which I feel meet the criteria needed in this kind of game.

There is no order of importance; all the games are equal and exceptional in their own way and all offer good value. I have assessed them accordingly – beginning, moderate and difficult.

COLOSSAL ADVENTURE – Level 9 Beginner

Based on the Crowther and Wood *Adventure* which started us on the way, the idea is very simple. Just find as much treasure as possible by exploring a network of underground caves and emerge alive with it. Tremendous fun.

PERRY MASON: The Case Of The Mandarin Murder – Telarium Moderate

An amazing adventure which puts you firmly in the role of Perry. You will need to use all your deductive powers in this excellent interactive game before you can prove your female client innocent of murder. A terrific true interaction adventure.

CASTLE BLACKSTAR – CDS Moderate

A classic adventure game, rich in text detail and full of logical problems. Your quest is to explore an old castle, find an orb and return it to the Lady Artemis. The game will keep you up until the early hours. Excellent.

THE HOBBIT – Melbourne House Moderate

The first adventure to introduce interactive characters. Help Bilbo overcome the dreaded goblins' dungeon, explore Tolkien's Middle Earth, find the treasure and return home with it.

Truly another classic landmark in adventures. Remarkable.

ENCHANTER – Infocom – Difficult

Of all the adventures I have played this must take pride of place in my collection – for sheer pleasure nothing can touch it. Playing the part of a young novice Enchanter you must, armed only with a spell book, enter the evil Krill's domain and defeat him. The adventure is everything the experienced gamester could wish for – and more.

So what of the future? The future of adventure gaming looks very rosy indeed now that more companies are beginning to realise that there is a very big market. New games are becoming more and more sophisticated, with 1,000-word vocabularies, full sentence parsers, multi-tasking and better, clearer graphics.

QUESTPROBE 3

▶ *Spectrum/CBM64/Amstrad/Atari/BBC ● U.S. Gold ● Graphic Adventure ● Roger Garrett ● £9.95 BBC £7.95*

GRAPHICS
●●●●
SOUND
None
PLAYABILITY
●●●●
VALUE FOR MONEY
●●●●●
OVERALL
●●●

At long last the eagerly-awaited *Questprobe 3*, featuring The Human Torch and the Thing, has been released by U.S. Gold. For anybody who has not yet played a Scott Adams game – is there anybody? – let me tell you they are not easy.

Based on the Marvel comic characters, you take the part of both heroes. A pleasant effect has been created in that, by switching roles, you can help your partner. For instance, if you are in the form of, say, The Human Torch when you examine Thing, an instantly-drawn graphic of Thing appears, using the split-screen method with which, I am sure, we are all familiar. Then, by switching roles, you see a picture of The Human Torch – different to say the least.

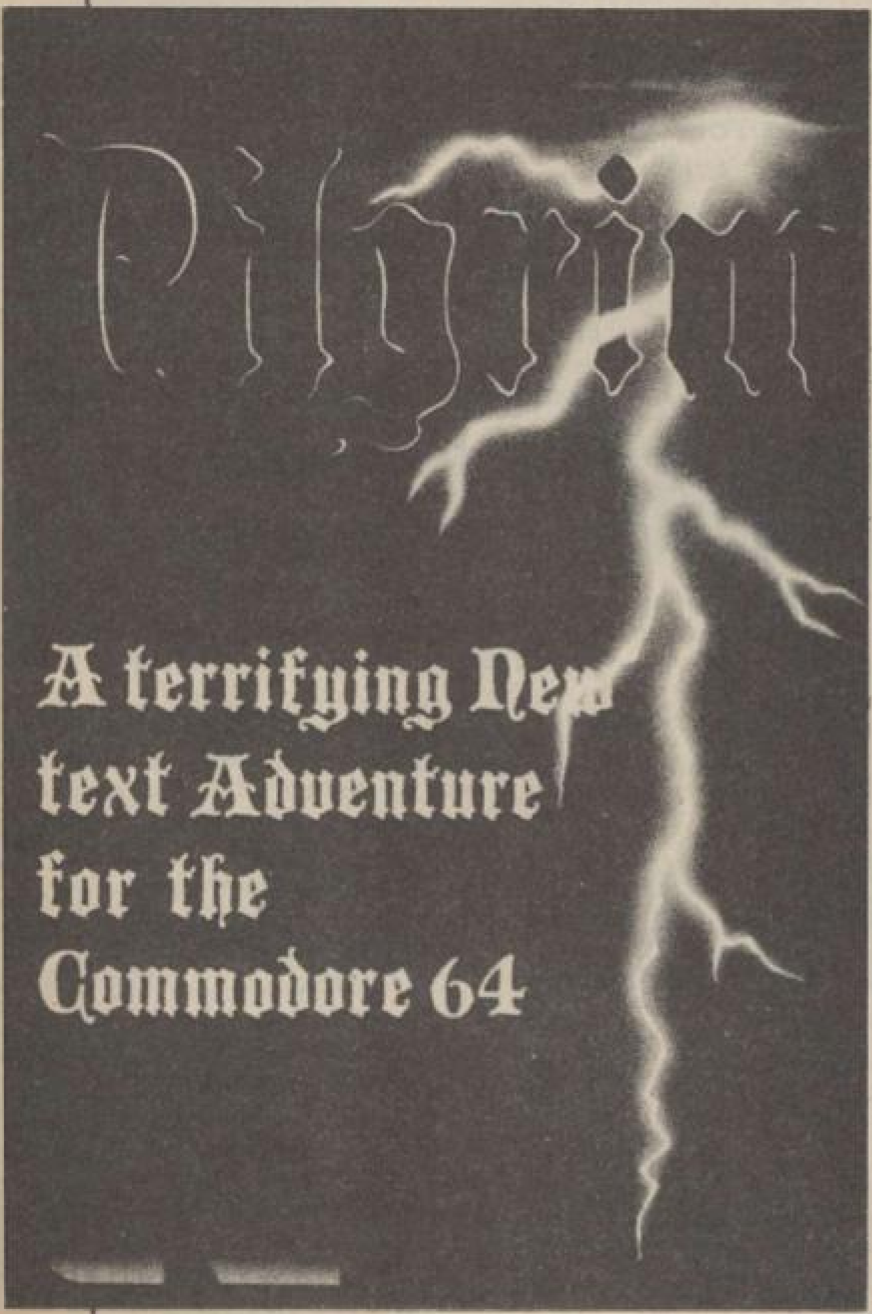
Your mission is to save Alicia Masters from the evil Dr Doom. To hinder you in your task are such motley villains as Blob, a rather cheerful monstrosity, who is able to bond himself to the Earth by force of will. Then there is Ringmaster and his unsavoury Circus of Crime, which contains as villainous a bunch of performers as you could wish to meet.

The parser accepts complete sentences using 'and' and 'then' as linkwords and the graphics are well-defined and instantly-drawn.

Questprobe 3 will definitely be a giant hit but my feeling is that the Adams database is a little obscure and the price is £2 too much, but I doubt if that will deter any would-be superhero/ines from buying the game.

PILGRIM

▶ *CBM64 ● CRL Group plc ● Text Only Adventure ● Roger Garrett ● £7.95 cass £12.95 disc*



GRAPHICS
None
SOUND
None
PLAYABILITY
●●●●●
VALUE FOR MONEY
●●●●●
OVERALL
●●●●●

Long ago, before history was written, there was a land called Meridan, inhabited by a simple and peace-loving people. Legend has it that the land is watched over by a strange force called the Guardian who dwells deep in the bowels of the Meridan mountains and, if ever needed, will help the Meridians in their darkest hour.

Far to the west is another darker, violent land, where the cruel, sadistic Silvians, a vicious war-like horde of Barbarians, live. One dark stormy night, the Silvians descended on a small village, leaving behind death and misery; the sole survivor, you, vows to find the Guardian and test the legend.

Author Rod Pike must be congratulated on his wonderful prose-like text-only descriptions. They are exceptional, imparting in the player all the mixed emotions experienced while involved in the task, such as fear, sadness and apprehension.

The problems, which are many, need to be worked out carefully but are very logical and practical.

On your travels you will be saddened by the remoreseless destruction caused by the Silvians. Stumbling across some burnt-out shack reminds you of how life was before the Silvians attacked.

Before this adventure is over you will have truly lived the game. My only piece of advice is to examine each location very carefully or you will miss some important clues and, remember, everything you find has a purpose.

I also feel that CRL has taken a big step forward in releasing this purist adventure. It is gratifying to see a well-known company release a game without the compulsory graphics.

I know this is Pike's first game but I sincerely hope it is not the last. I would love to see a follow-up in the not-too-distant future. Overall, I feel *Pilgrim* is destined to become a classic – my advice is to buy it now.

THE VERY BIG CAVE ADVENTURE

► *CBM 64 ● CRL Group plc ● Graphic/Text Adventure ● Lee Paddon ● £7.95 Cass, £12.95 Disc*

GRAPHICS
●●●●
SOUND
None
PLAYABILITY
●●●●●
VALUE FOR MONEY
●●●●●
OVERALL
●●●●●

Hands up anybody who has not seen, played or read about the original cave game *Adventure*, so-called because there were no adventure games around at that time, so there was no point in calling it anything else. Released by software houses under different names such as *Colossal Adventure* and *Classic Adventure*, the game remains an old-time favourite of most ardent gamesters.

Set in a decaying underground scenario, the idea was to find as much treasure as possible, solve some rather illogical problems, and return with the goodies to your little hut but – and it is a big but – did you know that the original game was never released? Instead it was locked away in some gigantic database – never, or that is what was hoped, to see the light of day.

For years the game lay in limbo, until one bright morning a young pupil of St Brides School for Young Ladies hacked innocently into the American government's most secret mainframe database, and guess what she found?

There, in all its glory, was *The Very Big Cave Adventure*. St Brides has done to adventure what Fergus McNeil did to *Lords of the Rings* and very funny it is, too. All your old favourites are waiting to meet you again, plus a few new ones, among them a rather ferocious bull in a deep gully – Gully-Bully, would you believe? – a slightly balding gentleman with a ginger beard who throws sharpened ZX-81s at you – does that remind you of anybody? – and the proverbial Python, with a rather novel way of getting rid of it, all in the best of taste.

Text descriptions are long and very funny, graphics are clear and instantly-drawn. My only criticism is that if you



have not played the game in one of its other earlier forms, then many of the puns will mean nothing to you; but do not let that comment deter you from an otherwise excellent game.

NINE PRINCES IN AMBER

► *CBM64/128 + Disc Drive ● Telarium ● Graphic Adventure ● Roger Garrett ● £19.95*

GRAPHICS
●●●●
SOUND
●●●
PLAYABILITY
●●●●●
VALUE FOR MONEY
●●●●●
OVERALL
●●●●●

I must say I have always been impressed by the standard of adventures released by the Telarium Corp. Earlier games such as *Dragonworld, Amazon* and *Farenheit 451* gave only a foretaste of what was to follow. With the release of *Perry Mason* and *Nine Princes in Amber* it now appears that Telarium has fulfilled the earlier promise.

Nine Princes is based on the first two books of the *Amber* series written by Roger Zelazny. Taking the part of Corwin, one of the nine princes, you must endeavour to find your way back to Amber and fight for the throne against your eight brothers and four sisters.

To make life a little more difficult, you start this game with a bad case of amnesia. The only way to win is to make alliances with members of your family.

So if you want something a little more challenging, my advice is to buy a Telarium adventure novel and immerse yourself in its intriguing worlds.

COUNTDOWN

► *Spectrum 48K ● Central Solutions ● Graphic/Text Adventure ● Roger Garrett ● £1.99 Cass*

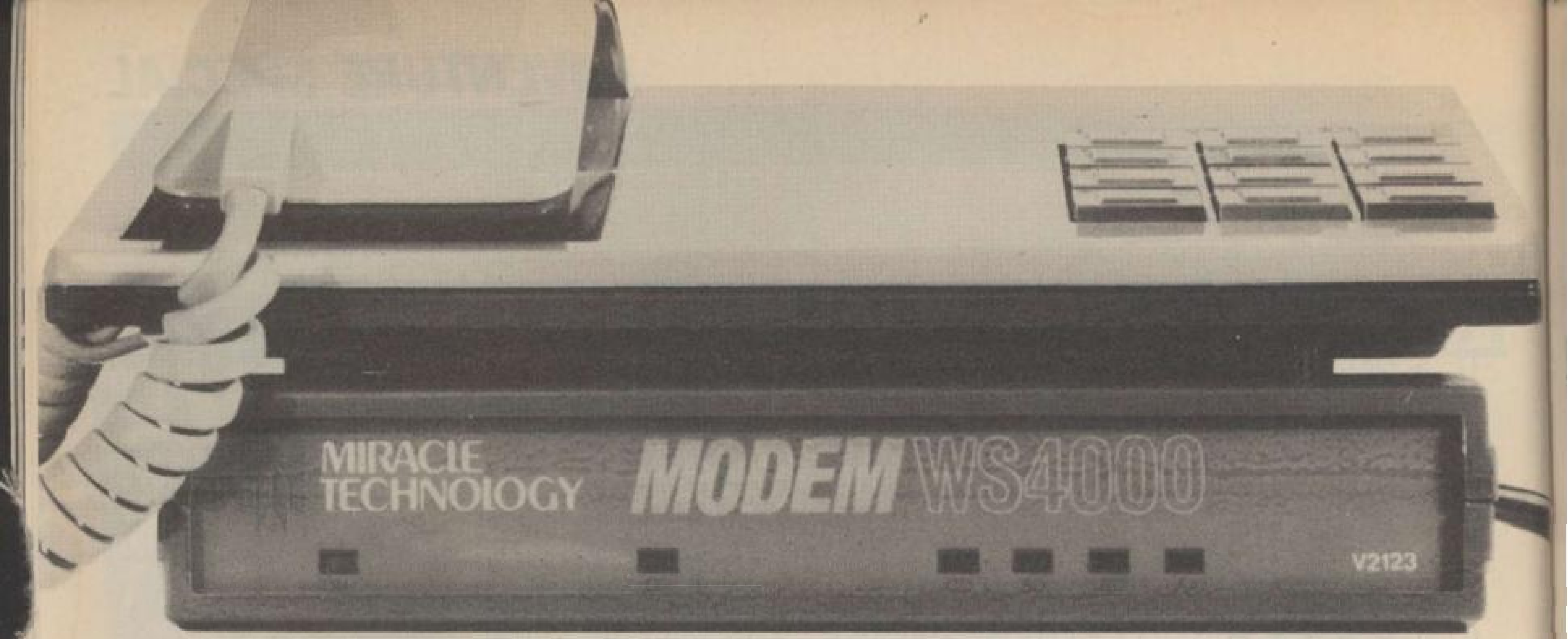
GRAPHICS
●●●●
SOUND
None
PLAYABILITY
●●●●●
VALUE FOR MONEY
●●●●●
OVERALL
●●●●●

When the bigger software houses release new adventure software it seems that much of the lesser-known software releases tend to take a back seat, due, no doubt, to the fact that they have less financial muscle than the major concerns and are less able to advertise their games.

It is not often a company will commit itself to releasing new adventures without some form of pre-publicity but one company doing it is Central Solutions. In the last few months the company has released somewhere in the region of 20 Quilled adventures for the Spectrum CBM64 and, at only £1.99, they represent very good value.

One such game I can recommend thoroughly is *Countdown*. The action takes place in a large mansion. You take the part of a unsuspecting journalist, summoned to a remote island by Sir Justin Phillips. On entering Sir Justin's creepy old mansion, the door suddenly slams shut and your task is to find a bomb and defuse it before you and the mansion are blown to pieces. Good, lengthy text descriptions create a tense and atmospheric scenario.

Finely detailed graphics, neatly done with the Illustrator, also add a degree of pleasure to the overall effect. I look forward to seeing more of the same and, at such a low price, this is a must for everybody's collection.



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The Control Alt Deli PC looks very like the IBM machine.

PC clone on test

The Amstrad sub-£500 PC clone should be here soon. Glyn Moody asks if the Control Alt Deli machine is necessary.

There has been an interesting side-effect of all the recent Amstrad and Sinclair shenanigans. We have gained a new word – clone. Everybody is talking about it, everyone seems to be about to launch one. All the world and his dog knows that Alan Sugar is about to spring one on a totally-suspecting world; it is rumoured that Sir Clive Sinclair was concocting one at the very instant that Sugar made him an offer he couldn't refuse – money. There are even suggestions that this was why the deal was made. So apart from being something to do with gay fashion, what is a clone? And how will it affect you?

First, some history. Once upon a time micros were fun and had nothing to do with pin-striped suits. That was official. The mighty IBM announced to the world that it would not be producing micros, because they were a passing fad. A few years later, in 1981, after Apple had progressed from being two youngsters in a garage to a billion-dollar company, IBM decided that perhaps after all it could just about bear to produce its own micro. With stunning originality, it called it the IBM PC.

Now there is a saying that nobody was fired for buying IBM. So all those businesses which had been dying to buy a micro bought an IBM PC. Even though the machines cost anything up to £3,000, IBM has now sold more than two million of them. Meanwhile, the other micro manufacturers, even the once-mighty Apple, have been having a difficult time. The home market has lost its fizz and its money; the business market is interested only if it has three letters on the front of the machine. Result – a brace of micro manufacturers have gone to the wall.

The IBM PC was steamrollering the opposition, and taking over the business micro world. Remembering another useful saying that if you can't beat them, join them, somebody had the idea of making their own IBM PC. After all, if you produce a machine which can do everything the IBM version does, and you sell it cheaper than the real thing, you should be on to a winner.

The first company to try was the U.S. firm Compaq. It produced a micro which could run all the software designed for the IBM PC and which was portable. It started selling like hot cakes. The Italian industrial giant Olivetti had made micros previously but they were not compatible with the IBM standard. As a result, they sold like cold cakes.

Casting corporate pride aside, Olivetti produced the M24, one of the earliest of the IBM clones. It ran all the IBM software, was much faster than the IBM PC, and cost less. It, too, sold like hot cakes. One by one, almost all the main micro manufacturers followed suit and produced their own clones, hoping to cash in on the huge and growing market.

If it had stopped there, they would be of little interest to the current owner of a Sinclair Spectrum. Recently things have entered a second phase of this copycat game. It is a well-known fact that Asian countries like South Korea and Taiwan are hot at moving into a market and cleaning-up with very cheap copies. The world of the IBM clone presented them with a perfect opportunity.

The technology was very simple and well-tried. Moreover, it was an open system – to encourage third-party suppliers to make add-ons, IBM had very helpfully published all the details of the machine. That made copying even easier. As more and more people bought IBMs and clones, the price of components fell dramatically. Since cheap labour was plentiful in those countries, it soon proved possible to produce a perfectly standard IBM clone for half the full IBM price. Even now, that price has fallen further until the latest rumours about the Amstrad PC whisper prices around the £500 mark – which is where you come in.

C for clone – C for cheap

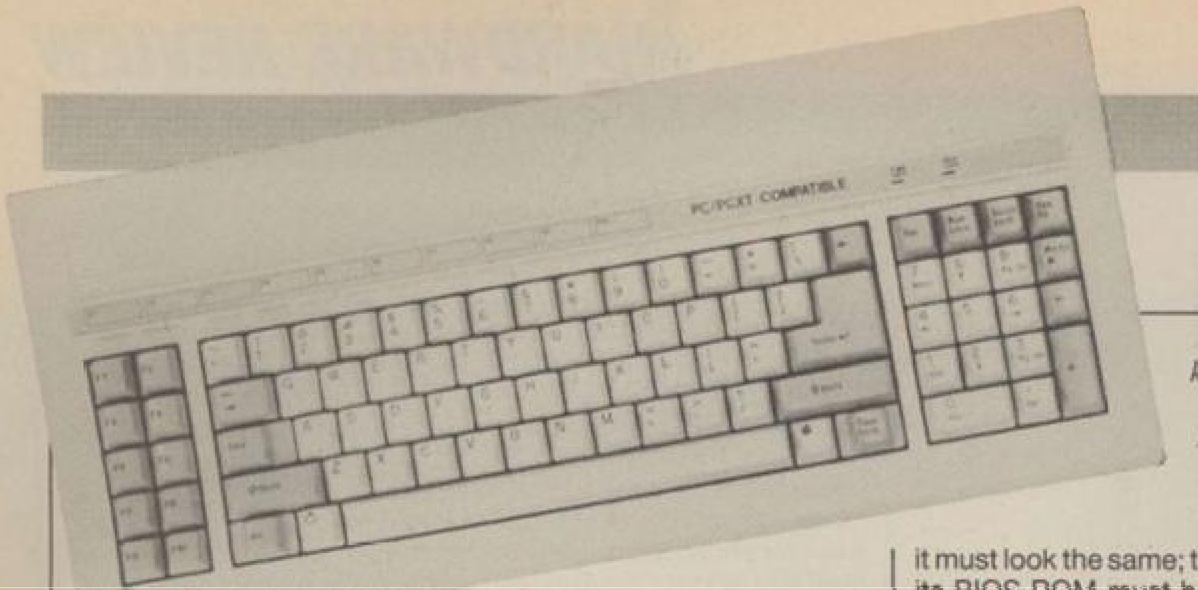
No longer are the PC clones cheap business machines; they are cheap, full stop. For that £500, you are probably talking about a complete system with printer, just like the Amstrad PCW8256. The difference is that instead of creating a whole new market as with Sugar's amazing word processor with its strange little 3in. discs, the clone is joining the biggest micro ball-game of them all. There are probably more than 10,000 programs for the IBM PC and the number is growing hourly.

So how can you recognise an IBMulator? At the heart of the machine you need an Intel 8088 processor. It is a hybrid; its internal architecture is

Continued on page 36



The Control Alt Deli allows easy access to the main circuit board.



The keyboard uses the IBM AT layout.

Continued from page 35

16-bit but it can move data around only eight bits at a time. This chip, rather than the fully 16-bit 8086, was chosen to save a little money; it also slows the machine. It is very easy to improve on the IBM PC by opting for the full 8086 chip which uses 16-bit architecture throughout. This is one of the problems of being a true, 100 percent clone – you have to imitate the IBM PC, warts and all.

The IBM uses 5.25in. discs, each of which stores 360K. Again, by present-day standards with 720K on a 3in. disc, this is feeble – but a standard is a standard. The IBM keyboard is distinctive, with a backslash key placed where the left-hand shift key should be. Many manufacturers have been tempted to improve on that state of affairs, including IBM, which produced the so-called AT keyboard. Different clonemakers adopt different attitudes.

PC clones rarely have less than 256K RAM these days. They may also have a serial port for modems and printers and a parallel port for a printer. On the original IBM PC they were all extras, as was the video card you needed to be able to hook-up a monitor. Some clones also charge extra for that rather vital piece of equipment; others may offer you a range, for example mono or colour.

Unfortunately not just any old video card will do. It must be one which is compatible. Compatible means that it will work with all the standard IBM software. Which brings us to the nub of what being a clone means. Having the proper processor and the correct disc drive is not enough; after all, both the BBC B and the Apple II use the 6502 processor, yet it is difficult to imagine more incompatible machines. The secret lies in the operating system and the standard ROMs which are used.

The operating system on the IBM PC is called PC-DOS, an outgrowth of MS-DOS, named after its supplier, Microsoft. In fact, MS-DOS is really a 16-bit derivative of that old faithful CP/M. In other words, it is almost incomprehensible to the beginner, what with its uninformative prompt A>, and commands like DIR. PC-DOS is simply the version used by IBM. Rumour has it that IBM originally went to Digital Research, which produced CP/M. Unfortunately, so the story goes, Gary Kildall, the founder of the company, was out flying his aircraft. The men in blue suits became bored with waiting, so went to see Microsoft instead.



In true IBM tradition there is plenty of scope for expansion.

The key to running programs designed for the IBM PC lies in the so-called BIOS ROM which works with PC-DOS to handle the machine's housekeeping functions. That read-only memory determines how data is got in and out of the micro. Effectively, it defines how the hardware looks to software which is running on it. If a clone is to run IBM software, it must look the same; that is, its BIOS ROM must handle input and output in the same way.

The obvious way to arrive at that state of affairs is to use a ROM which is identical to that of IBM. For some reason, however, IBM takes exception to that kind of copying. In fact, it must do so. After all, anyone can use the Intel 8088 processor or the same type of disc drive – IBM has no patent on them – but it owns the copyright of its BIOS ROM. So clone manufacturers have opted for various close approximations to the IBM chip. They are in rather a quandary. If the chip is too close, IBM will sue; if it is not close enough, the clone will not run all IBM programs.

By definition, no legal clone can run every single program for the IBM; the only 100 percent IBM clone is the IBM PC but it is possible to produce clones which run almost everything, and certainly nearly everything you are likely to encounter.

This need for software compatibility provides you with the perfect way to test how good a clone is. There are an accepted number of IBM programs which are used as standards to test the extent of compatibility. One is *Flight Simulator*, from the same Microsoft which produced the operating system. It was one of the first flight simulation programs and is still a top-seller on the IBM PC.

This and other programs give you a handle on how compatible a clone is. If you are thinking of buying a clone, make sure you get definite statements about what it will run. A claim that it is 100 percent compatible is as worthless as it is meaningless. Also check the legality of the BIOS ROM. There are several widely-used ROMs to which so far IBM has made no objections. One is the Phoenix ROM from the U.S. and the other is the ERSO ROM from Taiwan. IBM has recently started to get heavy with some clone manufacturers whose ROM was a little dubious, or whose casing was too close for IBM comfort. We are likely to see much more activity on this front in the next few months.

The possibility of a 50-billion-dollar company coming down on them like a ton of bricks has not deterred the clonemakers, either overseas or in the U.K. Most of the major manufacturers like Commodore and Tandy sell their own clones. In addition, there are about 20 or 30 small, young companies which have sprung up recently which are importing mostly Taiwanese clones into the U.K. for prices starting around £500.

One of the new companies is the quaintly-named Control Alt Deli. It has a standard clone, as yet unnamed, with one drive, 256K RAM, keyboard and graphics card but no monitor for £499; a dual drive model costs £695.

We looked at the version with a massive 20MB Winchester which cost a very reasonable £1,195, less than many hard discs on their own.



The right-hand side of the review machine featured a massive 20MB Winchester drive.

Included in those prices is a mono video board which is Hercules-compatible. Hercules is another standard in the IBM world and is a useful feature. A monitor will cost from £40 for the cheapest Taiwanese model to £250 for glorious colour. An unusual feature which is standard is a turbo board. The ordinary IBM PC runs its processor at a rather feeble 4.77MHz. The Control Alt Deli clone lets you swap between that speed and a zippier 8MHz. That speeds things significantly. You switch between the speeds by holding down three specific keys together. The cursor changes from an underline to a small square in the faster mode.

On the review machine there was a slight problem in that at the higher speed you could not read from or write to the floppy disc. Apparently that is caused by a bug in the new ERSO BIOS ROM the company is using – one which we were assured would be fixed, and the upgrade sent out free.

Another recent change has been made to the appearance of the casing; it follows IBM's words with two other clonemakers about the too-familiar appearance of their machines. The quality of construction is high throughout. The keyboard uses the AT layout employed by IBM on its later PC/AT, which is better in all respects.

Like all PC clones, the Control Alt Deli machine is big and occupies a large amount of space. Rather neatly the lid lifts up like a car bonnet, revealing a tidy interior. A fair amount of that is empty. As mentioned, the IBM and its clones use open architecture. That means you can plug in all kinds of extra goodies as and when you need them. For that purpose there is a row of expansion slots inside the machine. They give direct access to the micro's main data bus.

Running a series of standard Basic benchmarks produced excellent results. Even at the slower processor speed the clone was 16 percent faster than the straight IBM; running at the turbo 8MHz it was twice as fast. The disc drives were also perky. Unfortunately, I had less luck with the standard compatibility tests. Neither Flight Simulator nor Lotus 1-2-3 would run, though they appeared to load. A glance in the manual for the video card confirmed that that was where the trouble lay. The manufacturers assured me that with suitable video cards, all the standard tests will run. If you are really concerned about the compatibility, which you should be, you need either to see them running or at least have it in writing that they do.

Performance on par

The Control Alt Deli clone emerges as a robust machine at a price which is as good as you will find anywhere. So far as I could tell, the machine is legal throughout – not always the case with clones. Apart from the problems I had with compatibility tests, the performance was well above par. The manuals are very skimpy, consisting of a few thin booklets which will be of little use to the beginner but the official IBM manual for the operating system supplied with the machine is very good.

So why should you buy one of these beasts, apart from wanting to impress your friends? First, because clones now cost no more than a BBC, Amstrad or Atari. Buying because it is a bargain is not really enough; the real reason is that you will have access to the greatest library of software available; though it is a little short on shoot-'em-ups.

There is a catch, of course, and that catch, as ever, is money. Many IBM PC programs cost as much as the clones themselves but that is changing. Some top-end applications will always cost a king's ransom but lately there has been a heartening number of price reductions, as well as the appearance of a new class of cheap – well, cheapish – programs for around £100. As more and more clones appear, and if Sugar does the decent thing and joins the club, we are certain to see more and cheaper programs, just as with the PCW8256. When that happens, it could be time to swap your BBC for a PC.

Conclusions

Clones are not just for business; they are here to stay at prices most people can afford.

Although the amount of games software available is limited, there are compensations in the huge libraries of other software, some of it free.

If you are thinking about buying a clone, remember that the companies which produce them came from nowhere and could well be going back there. Similarly, do not expect much in the way of support or hand-holding.

The IBMulator from Control Alt Deli is a good example of a low-cost clone. It is fast and well-built. We had some trouble checking its compatibility, though.

There are probably 20 other clonemakers in the U.K.; try shopping around and you could pick up a bargain near you. If you can wait, there is always the promise of a genuine Amstrad PC, though the wait may be a long one.

Specifications

CPU:	NEC V20, dual-speed version of 8088; runs at 4.77MHz or 8MHz
RAM:	256K on basic machine, 512K on hard disc machines; upgradable to 640K
ROM:	ERSO BIOS ROM
Mass storage:	One 360K 5.25in. floppy on basic model; second floppy and 10 or 20MB Winchester available.
Ports:	One serial and one parallel port as standard
Keyboard:	AT compatible, professional keyboard
Display:	Hercules-compatible high-resolution card as standard; monitors cost from £40 to £250
Software in price:	PC-DOS 3.10
Price:	Basic model with one floppy £499; twin floppy model £695; 10MB version £995; 20MB version £1,195
Manufacturer:	Interam, 62 Weir Road, Wimbledon, London SW19 8UG. Telephone: 01-879 1888
Distributor:	Control Alt Deli, 44 Brown Baker Street, Neath Hill, Milton Keynes MK14 6JH Telephone: 0908 662759

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"The best Atari mag on the market"

"A life-line down in Australia"

"Excellent magazine - very good value. Always good articles, reviews, programs, etc."

"Best thing since non-sliced bread"

"More appealing than any Page 3!"

"Well set out - programs I have tried have been good quality"

"A very well published magazine - easy reading"

"Excellent and informative"

"Every Atari user shouldn't be without it"

"Please continue to the same quality standard"

"Page 6 is a well put together magazine which has been of great use to me as an Atari user"

"Very interesting and useful"

"The reviews are very interesting and informative"

"I think Page 6 is the best magazine on the market today"

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"The mag all owners of the best computers should get"

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"A very fine magazine, keep it up!"

"Brill! I look forward to it"

"Page 6 is a very interesting and enlightening magazine"

"Super mag"

"Wouldn't be without it"

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"Brilliant, comprehensive and very useful"

"It is the best magazine available here in Holland!"

"Just keep up the good work and long live Page 6 and Atari"

"A first class magazine dedicated to Atari owners"

"A good magazine and getting better"

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"Good value for money and full of good articles, etc."

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"Excellent magazine - keep up the good work"

"How can you improve on perfection?"

"Every one a collectors item, since issue one"

"It is the best magazine I have ever read (I'm not creeping, I'm just honest)"

"Page 6 is marvellous, great! It is of highest possible standard - I could never miss it"

"Brilliant and getting better with each issue"

"The best Atari magazine for beginners"

"I think it is an excellent magazine and I look forward to it"

"Excellent magazine - I have got every one"

"Good value for the money - a good read from cover to cover"

"Excellent for reviews, games, tutorials, etc. - would not like to be without it. Always excited by its arrival"

"I wish I had known of its existence earlier. Keep on going, you're doing splendidly"

"A great reader's friendly mag with a patient, equally friendly, staff"

"Only one - just keep on improving (can you get better?)"

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PAGE 6 - *COMPLIMENTING AND EXPANDING THE WORLD OF ATARI*

A date with Psion

A gadget for yuppies or a useful tool? Which statement most accurately describes the Psion Organiser II. In Peter Luke's view nobody should be without the new pocket computer.

Forget your diary, calculator, watch, alarm clock and, heaven forbid, Filofax. Instead, slip a Psion Organiser II into your pocket for it will do the job of all the aforementioned aids to coping with the demands of everyday life.

That might be the way in which an advertising copywriter would begin a description of the latest Psion pocket computer. While obviously exaggerated, who would dare to suggest that life could go on without a Filofax? The Organiser II, used intelligently, can help one steer a smooth path through the hurlyburly of the working day.

The Organiser II, by virtue of its variety of built-in functions, defies any attempt to pigeon-hole it into a particular area of application. It presents a moving target, taking on a variety of persona, some of which have been listed.

Switching-on the computer will display a list of some of the built-in functions which are immediately available – the two-line LCD display is too small to list all the functions, the cursor control keys are used to bring a further set of function into view. Selecting a particular application program is a matter of entering the initial letter of the required program or, alternatively, the Organiser cursor may be moved to the required entry followed by a single press of the EXEC key.

One of the most useful of the in-built functions is the personal database. It will accept records which may contain up to 16 lines, a complete record being 254 characters maximum. Having entered a record via the Save function, it may be retrieved by entering a character string known to be contained in the entry.

The Organiser will then display any record which matches the given string. A sensible approach to structuring the information entered to the computer will mean that it will perform all the functions of a computerised address book, doing the job more effectively than a paper notebook.

The Diary function of the Organiser can best be likened to a two-dimensional spreadsheet in which the vertical entries are formed by half-hourly times during the day, while the horizontal slots represent the days of the year until 2000. A particular time on any day may be selected by using the cursor keys to advance from the present time – useful if the information to be entered is in a time-slot near to the present time – or a Goto option may be used to select readily any time in the more distant future.

A textual prompt may be entered when the appropriate time-slot is located and the computer may be programmed to sound an alarm at anything between 0 and 59 minutes before an appointment.

Among the many other functions provided by the Organiser are a clock, alarm clock, very powerful calculator and, almost incidentally, a very powerful general-purpose computer using OPL – Organiser program language. That owes much to Basic but dispenses with the line-based restriction of that language, depending instead on a powerful, procedure-based approach to writing programs.

The Organiser II can be used with a variety of data storage and program cartridges. At present, program cartridges available include a personal finance package, an advanced mathematics program and a spelling aid in the form of an extensive spell check dictionary.

The CM model can be used in conjunction with an RS232 interface lead to communicate with other computers and, with the aid of a modem, remote databases via the telephone system. The more powerful XP model can, in addition, be used with such peripherals as a mag card swipe and bar code reader.

If you use a Marks and Spencer credit card you will have seen the earlier version of the Organiser in action – one is used to verify the credit status of any card when presented at a point-of-sale terminal. That type of vertical application is where most sales of the Organiser will be made. In the meantime, if you have £100 to spare and want to be one up on the Filofax crowd, the Organiser is for you.

At a glance

Processor:	HD6303X
Memory:	ROM 24K (CM) 32K (XP)
	RAM 8K (CM) 16K (XP)
Display:	2x16 LCD
Keyboard:	32 keys
Weight:	225 grams
Dimensions:	142x78x29.3mm
Price:	£99.50 (CM) £139.50 (XP)



MUSIC COMPENDIUM

Anyone who has tried to compose music on the Commodore 64 will know that the SID sound chip is not easy to contact via Basic. Complex machine code routines are needed to make SID sing in the three-part harmonies of which he is capable.

How useful it would be to have a program which allows you to produce musical accompaniments for your graphic masterpieces using little more than a joystick. That is just what the *Music Compendium* promises – and much more besides.

In fact, the Compendium is a suite of musical programs on a double-sided disc. First, there is a pair of tutorial programs, teaching you the fundamentals of musical terminology and notation.

Guitar tutor

Then there is a guitar tutor which allows you to tune your guitar to notes generated by SID and then shows you how to play a chord. Major, minor and seventh chords for any key are selected from a grid and then displayed on a chart which tells you which fingers to place where on the guitar fretboard. A bigger choice of chord types would have made the program more useful.

Next is a Sid chip tutor which guides you gently through the intricacies of the SID, providing aural examples where necessary. Graphic representations of waveforms and envelopes illustrate the text.

Flip over the disc and you encounter "the play-a-long", a program which provides musical accompaniments in any major or minor key in a choice of four styles – boogie, country, disco and waltz. The patterns are very simple and it is difficult to imagine the program providing "hours of fun" as the manual claims.

Next, there is an attempt at a drum machine which allows you to build rhythms by defining patterns for simulated bass and snare drums and hi-hat cymbals. Up to 40 bars can be defined and combined in any order to form patterns up to 999 bars long.

Unfortunately, the rhythmic sounds produced by the SID chip are not very convincing, especially for anyone who has heard the quality of sounds which sampling drum simulators such as the *Comdrum* or *Tron Digidrum* can produce.

Making melodies

Finally, you reach the tour-de-force, The Creator, which lets you produce complex three-part melodies making full use of the musical potential of SID and to produce machine code files of your compositions. They can then be used directly in your own Basic or machine code programs.

Most of the composing is done on a single icon-driven screen using, for many functions, only a joystick. Tunes are assembled on a note-by-note basis, one voice at a time. Each note is selected from a rather confusing five-octave keyboard which seems to include brown notes in addition to the more common black-and-white types.

Moving the joystick left or right selects the required note; wiggling it back and forth selects the length of the note. In that way you can construct a sequence of notes quickly – up to 2,000 – using any or all of the three voices. The pitch, duration and waveform of each note can be defined separately and impressive filter sweep effects introduced.

► *CBM64 & Atari*
● *Colleen*
● *Musical Toolkit*
● *Tony Sacks*
● *£49.95*

Complex music

Complex pieces of music can thus be assembled fairly painlessly but as notes are entered individually and not in bars, it can be difficult co-ordinating the channels to produce a coherent piece of music. There is no representation of the complete score and even in the edit mode you can view only one note at a time.

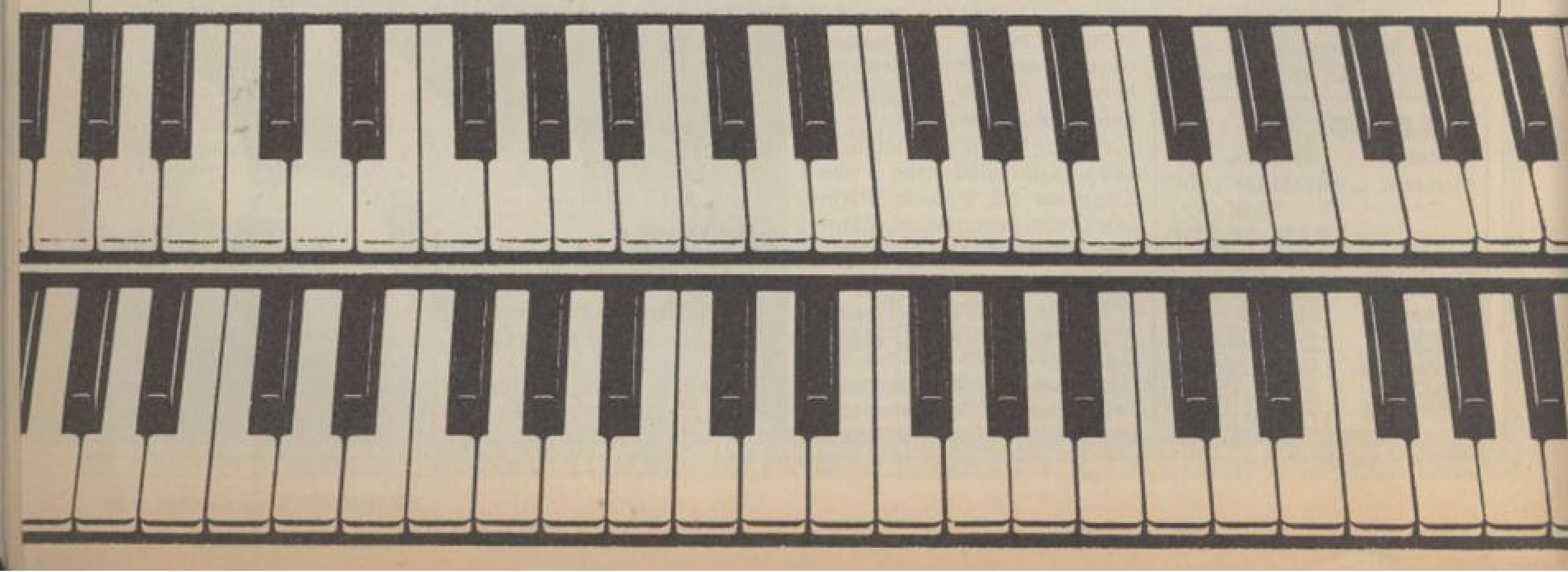
That, then, is Music Compendium, an interesting if variable collection of programs on a musical theme. The biggest disadvantage of the package is its price.

Most of the programs on side one cover topics which are dealt with more comprehensively in books which, in total, would cost less than half the price of the package. The play-a-long and drum machine programs can be fun but cannot justify the cost of the package which must, therefore, stand or fall by the Creator program.

Worth the money?

The Creator certainly makes music-making with the SID a considerably less trying experience but unless you are a professional games programmer, is it worth paying £49.95 for it? The decision is yours.

One final note. For a package which purports to be educational in part, the spelling is atrocious. It is inexcusable for a professional piece of software to include such blunders as "generater", "manuel", "infinate", "curser", "rhythem" and "cymble". Perhaps by the time the package reaches a production version those errors will have been eliminated.



Another Cheetah add-on for Midi

Cheetah are well known for their range of Spectrum add-ons. One of these, the Spectrum, has proved a success and has shown that the company have a commitment to the design and marketing of low-cost music peripherals.

The company. have recently launched another music add-on in the shape of a £49.95 Midi Interface. Regular readers of *Your Computer* will know that Midi – Musical Instrument Digital Interface – is a standard system of communication protocols that allows a computer to control musical instruments fitted with a suitable Midi socket. The Cheetah interface provides a full complement of Midi facilities including a Midi in/out and through, a real or step time from the instrument or the computer, full Midi compatible assignments. The user can store thousands of notes and initiate a forward or reverse sequence play-back. A Midi delay facility is also provided.

The unit plugs into the Spectrum's expansion port and is comnpatible with both 48K and 128K Spectrums although the 128K version of the computer has an in-built Midi port. Of more interest to 128K will be that Cheetah can supply a Midi lead for £9.95.

An Amstrad version of the Midi interface should be available by the early summer.



Three-in-one package

The design of the Spectrum computer shows its age in more ways than one. In particular when compared to more recent machines, the Spectrum is, shall we say, rather short on interfaces. There are many products on the market which compensate for the lack of I/O capability and the Romatic Robot Multiface One is one such unit. It is unusual, though, in that it provides the user with three distinct interfaces in one neatly-designed package.

The three interfaces comprise a Kempston-compatible joystick interface, about which there is little more to say; a universal, automatic program save facility; and an 8K RAM extension. The latter facilities require a little more in the way of explanation.

The interface is connected to the Spectrum expansion port, making sure that the switch on the left-hand side of the unit is in the on – down – position. With that switch in the off position, the interface is transparent, meaning that there will be no danger of any program failing to load because it detects the presence of the add-on unit.

Six actions

Powering-up the computer will then display the familiar Sinclair copyright notice which will be replaced by the Multiface menu when the red button on the top surface of the interface case is pressed. That menu allows the user to select one of six actions.

The first of those options is to exit to Basic, either quitting any existing program or returning with the option of studying/altering any resident program. In that case the interface will make every effort to preserve the program in an intact form, the interface saving the program as a compressed RAM image in four parts. A successful exit from a program gives the user full access to a program which may be re-started providing that the start address is known.

Tool option

Programs in memory may be saved to a variety of media, including Microdrive, Wafadrive, Beta, Discovery indirectly, via tape, to other disc systems.

The tool option from the main menu allows areas of memory to be examined and, if required, altered by way of a Poke command.

Valueable range

Other options include a Copy screen command, assuming that the printer interface in use supports a screen dump utility and a jump command which allows the program to jump to a specified address within memory.

At £39.95, Multiface One is not the least expensive of Spectrum interfaces but it builds in a valuable range of facilities. Both as a serious aid to developing programming skills and, on a lighter level, as an aid to playing some games, the interface represents good value.

Each of the games reviewed in Software Shortlist has been extensively evaluated by our expert team of reviewers.

We do not include reviews of unfinished products in this section of *Your Computer* – these are the games that you can buy now or in the very near future.

See the software previews and news features for advance news of games under development.

Soft Star

Guide to Games Reviews this Month

AMSTRAD	SPECTRUM	COMMODORE	COMMODORE
Equinox	Empire	Empire	Space Pilot
Kaiser	Equinox	Titanic	Raging Beast
	Cyberun	Golf Construction	Polo
	Kirel	Cauldron II	Spiky Harold
	Spiky Harold	Kaiser	Seabase Delta
	Delta Wing	Touchdown	Countdown to Meltdown
		War Play	

NEXUS

▶ *Various* ● *Nexus* ● *Arcade Adventure* ● *Lee Paddon* ● *£9.95*



Smashing drug rings, rescuing friends kidnapped by ruthless cut-throats and still making the copy deadline is all in a day's work for the average journalist. In *Nexus*, you have the chance to see whether you have what it takes to join the El Vino's set.

Journalists are not a violent race by nature and it is possible to play most of Nexus without drawing blood. If roused – for instance, if someone claims it is his round – our paragon of polished prose is equipped with guns, knives, flying feet and fists.

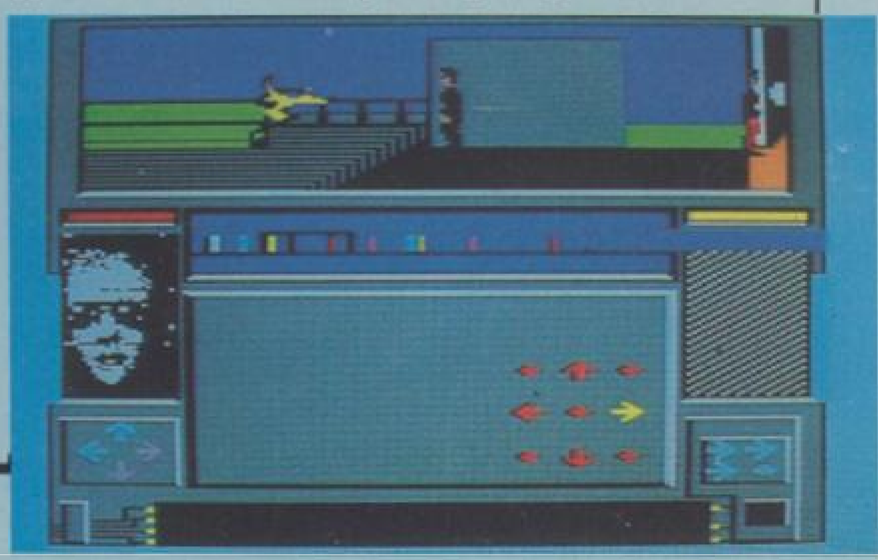
You have penetrated an undergrounbd complex. To complete your task, you must get help from Nexus. That is the resistance organisation in the complex which will give you weapons, advice and help out of a tight spot. Cultivating the members' friendship is vital, so if you go around beating them up, you will be on your own.

The game is controlled from the joystick and is reminiscent of the Ocean *V* game, although the addition of people you are not intended to beat up gives it a new dimension. Like most fight games, there are 16 movements you can make with a combination of joystick and fire buttons. There is also a useful preview function on the screen, which indicates what will happen if you press the fire button.

You move round the complex with the aid of lifts, a map and a cluster of indicator light which show you the direction of a place or a person you have selected. To win the game, you must find all 128 fragments of message. You must then piece them together, decode them, and transmit them to your editor. If all that strikes you as being a little too cerebral, you can have a good time blasting away and beating hell out of the opposition. Most of the time you will only stun your opponents but there is a way to kill them which, for reasons of good taste, will not be revealed.

Another novel aspect of the game is the digitised pictures of people around you. That allows you to recognise members of the Nexus organisation when they appear. The authors, Tayo Olowu and Paul Voysey, who were behind the superb *Psytron* and the cult hit *Psi Warrior* have produced an interesting blend of combat game and arcade adventure. It is the kind of game which, even after you have solved it, which will not be quick, will have you returning for a quick spot of guard trashing now and then. It is certainly superior to V in most departments. Let us just hope the lack of that game's TV theme does not prevent it being a huge hit.

GRAPHICS
● ● ● ● ●
SOUND
● ● ● ●
PLAYABILITY
● ● ● ●
VALUE FOR MONEY
● ● ● ● ●
OVERALL
● ● ● ● ●



EMPIRE

► *CBM64/Spectrum ● Firebird ● Training Game ● Lee Paddon ● £9.95*

GRAPHICS
●●●
SOUND
●●●
PLAYABILITY
●●●
VALUE FOR MONEY
●●●
OVERALL
●●●

Space-trading combat game with many missions. Sounds familiar? Even if the plot bears some superficial resemblance to the Firebird best-seller *Elite*, the game does not. There is a plan view of your spaceship, showing surrounding planets, aliens, cargo and bases. You can turn, accelerate, brake and fire. There is also a map of the star system you are in and a map of the galaxy from which you can get an idea of what is happening.



The *Empire* is under attack from a bunch of marauding aliens. It is your task to repel the attackers and keep the galactic economy topped-up. Apart from the tedious business of blowing away everything in sight you have to take cargo back to the starbases. That means landing on a planet, flying through a forest – you would think with all this inter-stellar hi-tech you would have a computer do that for you – then shoot down a brace of missiles, grab the cargo and carry it back to the starbase.

The shoot-'em-up aspect of the game is rather simple and it is the planning aspect which maintains the interest, responding to the calls for help and generally repelling the alien hordes. A very different kind of game from Elite, it is rather less shoot-'em-up, rather more strategy. If you have always wanted to have your own galaxy, this could be what you seek.

SPACE PILOT

► *C16 ● Anco ● Shoot-'em-up ● Peter Luke ● £5.95*

GRAPHICS
●●●
SOUND
●●
PLAYABILITY
●●●●
VALUE FOR MONEY
●●●
OVERALL
●●●

Your task as the ace space pilot is to rid a quadrant of deep space of an alien menace in the form of waves of attack craft. Your craft is a highly-manoevrable fighter with an inexhaustable supply of missiles. They must be launched against the alien vessels, which in terms of design owe more than a little to Star Trek's Enterprise.

The alien vessels sweep in from ali quarters, as single ships and as groups of ships in attack formations. The alien vessels feature a natty line in heat-seeking missiles which they launch in the general direction of your fighter. By making the most of the speed and agility of your vessel it is possible to avoid the attentions of those alien missiles.

There are four stages, with the duration increasing with each. Bonus lives are awarded with every 10,000 points scored. One- or two-player options are provided, as is a high score table. The game may be controlled by a joystick or via the computer keyboard.

Space Pilot is an instantly-playable shoot-'em-up game with an element of strategy which means that its appeal will be more lasting than some other games of its type.

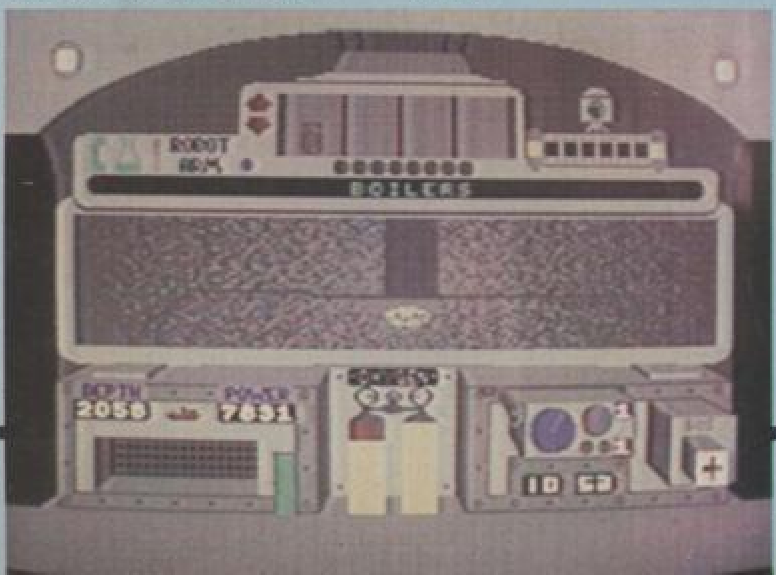


TITANIC

► *CBM64 ● Electric Dreams ● Arcade Adventure ● Lee Paddon ● £9.95*

GRAPHICS
●●●●
SOUND
●●●
PLAYABILITY
●●●
VALUE FOR MONEY
●●●
OVERALL
●●●

Titanic takes you to the icy waters of the North Atlantic, the last resting place of RMS Titanic after it struck an iceberg and sank on its maiden voyage. Your aim is to raise the ship and make a fortune from the salvage and publicity. The main action takes place aboard a mini submarine. In it you move round inside the *Titanic*, exploring the multi-level wreck.



The plot is a little implausable. The required flotation bags are already attached to the wreck. Unfortunately, you have forgotten where you put them. So you have to explore the wreck, solving little problems, capturing and manipulating objects to make progress.

Find and activate the bags and that is it. It would be if you had a bottomless pocket but money for running the operation and repairing the sub, should you be careless enough to bang it around, is needed from somewhere. You can either sell objects you salvage or hold press conferences and hope you can obtain favourable coverage, and thus get more money from your sponsors.

Not a bad game, with some pleasant little "sub" plots. The atmosphere is well-maintained with the murky view of the wreck from the sub and the claustrophobic feeling when inside the ship.

GOLF CONSTRUCTION SET

► *CBM64 ● Ariolasoft ● Simulator ● Lee Paddon ● £12.95 Tape/£14.95 Disc*



GRAPHICS ●●●●
SOUND ●●
PLAYABILITY ●●●●
VALUE FOR MONEY ●●●●●
OVERALL ●●●●

Golf computer games suffer from one serious problem. You either consider golf to be your idea of a good walk spoilt and the idea of playing the game on your computer fills you with fear and loathing, or you are such a fanatic of the game that you are out on the links despite the vagiaries of the British climate. Can *Gold Construction Set* balance on those two stools?

The game sets out to be a comprehensive simulator rather than just a game. To make a shot, you have to select a club, then position a cursor on a plan view of the hole, decide where to strike the ball, and your stance. Then you swing, choosing exactly how much power you intend to give the ball. All that, combined with such diverse factors as wind speed and direction, slope, temperature and ground condition will decide whether it is a hole in one – or through the club house window.

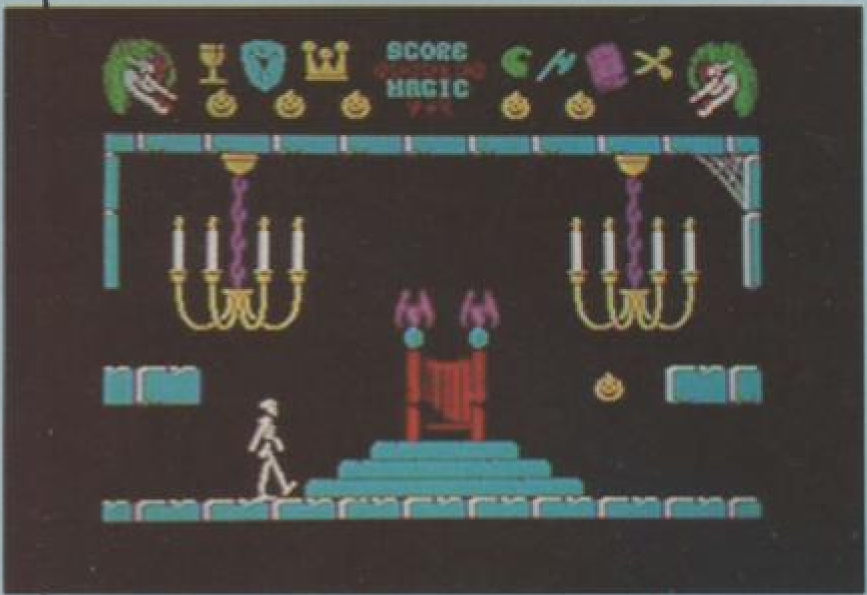
As if coping with all that is not bad enough for the novice golfer, when you start the game, you are allotted a long handicap. That is terrific, you think, until you discover that it means if you try to use anything bigger than a five iron, or really try to give the ball a belt, you will invariably wind up thrashing around in the undergrowth.

If you manage to play below your handicap, you can record the round and the computer will eventually give you a lower handicap. If the four championship courses bore you, it is time to build your own. Sand traps, water hazards, rough ground – all are at your fingertips. If you want to have a one-foot square green in the middle of a lake, so be it.

The game obviously represents the state of the art in golf games. It may well be a hit with the curious and the fanatical alike. If you are thinking of taking up the game, it will probably prove to be much cheaper than a set of clubs, plus fours and membership of a local club.

CAULDRON II

► *CBM64 ● Palace ● Arcade Adventure ● Lee Paddon ● £9.95*



In *Cauldron*, you, the witch, had to defeat the pumpkin. In the sequel, you have an attack of schizophrenia and play the pumpkin, anxious to do-in the evil witch. That, of course, leaves the way open to endless sequels, constantly switching allegiance.

The witch has grown rich and powerful since defeating the pumpkin, building herself a castle bearing more than a passing resemblance to the Palace Software logo. Your pumpkin has six lives to bounce his way round the castle.

There are six objects to collect, then it is off to the witches bedroom in the attic to cut a lock of her hair and then down to the dungeon to dunk it in the cauldron.

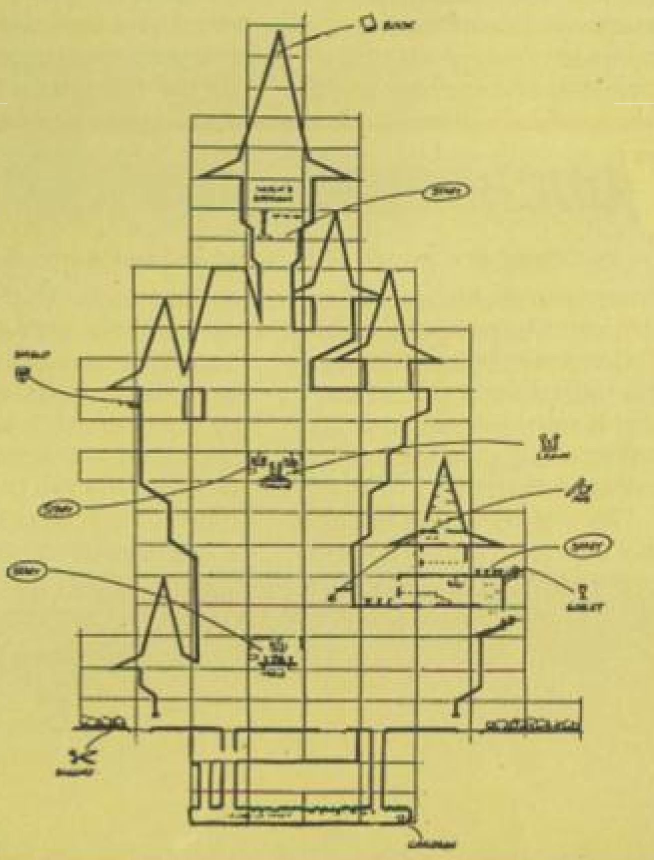
GRAPHICS ●●●●●
SOUND ●●●●●
PLAYABILITY ●●●
VALUE FOR MONEY ●●●●●
OVERALL ●●●●●

Sounds easy? You are kidding. After all, this is Palace – no-one ever solved Cauldron. Cauldron II is almost as tough. Every room of the castle is packed with nasties which you have to dodge or shoot. You can control the height of your bounce and also its direction but you have to plan your moves carefully, as the odd unforeseen rebound could send your pumpkin plummeting to its doom.

You have virtually no time to look at the lovely graphics or the visual jokes which abound – haunted mallets trying to bash mice, animated gargoyles and the odd disembodied hand.

Pleasant graphics, good atmosphere, addictive and frustrating, it has all the hallmarks of a classic in the same mould as Cauldron.

Goblet – Defence against hands
Axe – To open doors
Scissors – To cut the witch's hair
Crown – Defence against witch's magic
Shield – Defence against skeletons
Book of Spells – To complete game



EQUINOX

► *Amstrad & Spectrum ● Mikro-Gen ● Arcade Adventure ● Lee Paddon ● £9.95*

Poor old Wally. Mikro-Gen has put that lovable character on the back burner for a time and now he is being replaced by a machine. *Equinox* is simply Wally in outer space, with a spherical cyclops replacing our preambulating hero.

Before a new planet is fit for wallies, you have to go in and clean things up a little. Not only one thing at a time, so canisters of radioactive waste but the joint is also jumping with furry aliens trying to bump you off. Various objects such as drills, dynamite, keys and passes are hanging about. They have to be collected but you can carry only one thing at a time, so it is a process of working out a logical order to pass the various obstacles to put the nuclear waste down the disposal chute.



Working that out while being the subject of constant unwelcome attention of the local heavy mob is all rather testing.

As soon as you enter the room, swarms of the little beasties appear and set about you. Blaze away and run for the exit is about the best advice which can be offered. If you can manage eight levels of that kind of frantic activity, solve all the logical puzzles, keep any of your three lives intact, and stay off the Valium, you can consider yourself a jolly good droid.

GRAPHICS
●●●●●
SOUND
●●●
PLAYABILITY
●●●
VALUE FOR MONEY
●●●●
OVERALL
●●●●

Graphically striking, the game offers hours of manic action and looks next to impossible to complete. Mikro-Gen fans will have to add speed of reflex to their problem-solving skills.

KAISER

► *CBM64 & CPC464 ● Ariolasoft ● Hamurabi ● Lee Paddon ● £7.95*

GRAPHICS
●●●
SOUND
●●
PLAYABILITY
●●●
VALUE FOR MONEY
●●●
OVERALL
●●●

King and Hamurabi have been around as long as computers have been used playing games. You manage a number of commodities, sprinkle on a few natural disasters and see how well the player manages to do. This game monitors your performance in terms of working your way up the nobility but there is a twist; there can be up to nine other social climbers bent on doing the same thing.

How does this game compare to king of King games, the Ariolasoft *Mule?* Both are multi-player but whereas in Mule interaction was limited to trade wars, in *Kaiser* you fight real wars. When you start the game, everyone is too busy trying to survive but after a time the coffers start filling and players begin to cast covetous eyes over the shoulders of more successful players. Then the arms race starts and when, regrettably, hostilities begin, a new dimension of back-stabbing breaks out as players align themselves with others to either share the spoils of war or try to restrain a power which is being too successful.

In this game you must always keep a balance. Too many soldiers, and you have fewer farmers and the army costs money to maintain. On



the other hand, too few soldiers and you could find aggressive neighbours laying waste to large areas of your countryside. A fun game with a number of players. Perhaps trading a la Mule would have been pleasant, but still not a bad effort.

TOUCHDOWN

► *CBM64 ● Ariolasoft ● Simulator ● Lee Paddon ● £9.95*

There is no sin in the software industry like being second. *Touchdown* football follows in the footsteps of *Superbowl* and is from Electronic Arts, one of the top American software houses.

The first thing you notice is that there are only six players on each side. That obviously means there are fewer decisions to make about formations, which are made by pushing the joystick in the appropriate direction and pressing the fire button. The view is the rostrum camera angle familiar to players of sports the world over.



You select five-, 10- or 15-minute quarters against either a human or computer opponent. Once you have chosen your basic play, the offence snaps the ball and play begins. When playing the offence, you control the quarterback; as defence, you play a linebacker. It is then a question of looking for an opening for a pass or making a few yards on a rush.

All the usual features – punting, extra points and safety plays are there – and the graphics are functional and pleasing. More playable than Superbowl, the smaller teams means that it probably will not appeal to the true fanatic but if you have still not decided on a football game for your Commodore, it is worth looking at.

GRAPHICS
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SOUND
●●●
PLAYABILITY
●●●
VALUE FOR MONEY
●●●
OVERALL
●●●

CYBERUN

► *Spectrum ● Ultimate ● Shoot-'em-up ● Lee Paddon ● £9.95*

GRAPHICS
●●●
SOUND
●●●
PLAYABILITY
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VALUE FOR MONEY
●●●
OVERALL
●●●●

The first result of the U.S. Gold/Ultimate tie-up. Will this game be another Ultimate mould-breaker or just plain mouldy? The major problem which confronts you when you try to play an Ultimate game is that the goal is not spelt out in the whimsical instructions. You get the idea that pieces of your ship are scattered all over the place. The idea is to go round picking them up; then what? Generally just shoot everything in sight and a few vague hints about crystals, I suppose.

Controls are of the jet-pack variety – left, right and thrust; gravity takes care of the rest. You start with a fairly generous allowance of five lives, each of which is lost by being hit three times.

The graphics show an inhospitable alien landscape with clouds, meteorites, comets, caves and the whole place full of aliens in many shapes and sizes. It is all very atmospheric and pretty but scarcely the kind of thing to set the world on fire.

There is said to be a virtually insatiable market for shoot-'em-ups and, as they go, this is certainly superior to most. It is tough, addictive, fast and colourful, with pretty explosions. It is great fun putting the ship together and deciding which pieces you can attach in which order. It is the kind of game which will



generate a cult following as people discover the built-in wrinkles in the system. Not the kind of game to launch a million imitations but a competent effort nonetheless.

WAR PLAY

► *CBM64 ● Anco ● Shoot-'em-up ● Lee Paddon ● £7.95/£10.95*



Rambo, Commando, Who Dares Wins, running amok with machine gun blazing, seems to be this year's theme. Despite that, *War Play* offers something a little different which might earn it a respectable following. Instead of just fighting-off a bunch of computer-controlled kamikazis, you can blaze away at your best friend.

One player takes the role of defender, the other the attacker. Each has a certain number of bombers, fighters and tanks. The attacker's objective is to blow up a number of installations in the defender's territory. His object is to stop you. Each selects a weapon and off you go. If you choose a bomber and he picks a fighter, that is bad news. The best idea is quickly to swap it for a tank, which rather leaves him in the lurch. It is an interesting point whether it is best to try to eliminate the opposition before choosing the ground targets.

You can turn your tanks and aircraft in one of eight directions and the air forces can climb and dive. The local scenery you are setting-out to obliterate is all rather tasteful, with trees, walls, buildings – the usual army camp clutter.

Moving the tank around can be a bit fraught as you can become attracted by some of the scenery. That is particularly painful in the one-player mode, as the

GRAPHICS
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SOUND
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PLAYABILITY
●●
VALUE FOR MONEY
●●●
OVERALL
●●●

computer immediately calls-up an air strike and bombs the hell out of you. An interesting wrinkle on an old theme. A good one for the violent but sociable type.

KIREL

► *Spectrum ● Addictive ● Arcade Adventure ● Lee Paddon ● £8.95*

GRAPHICS
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SOUND
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PLAYABILITY
●●●●
VALUE FOR MONEY
●●●●
OVERALL
●●●●

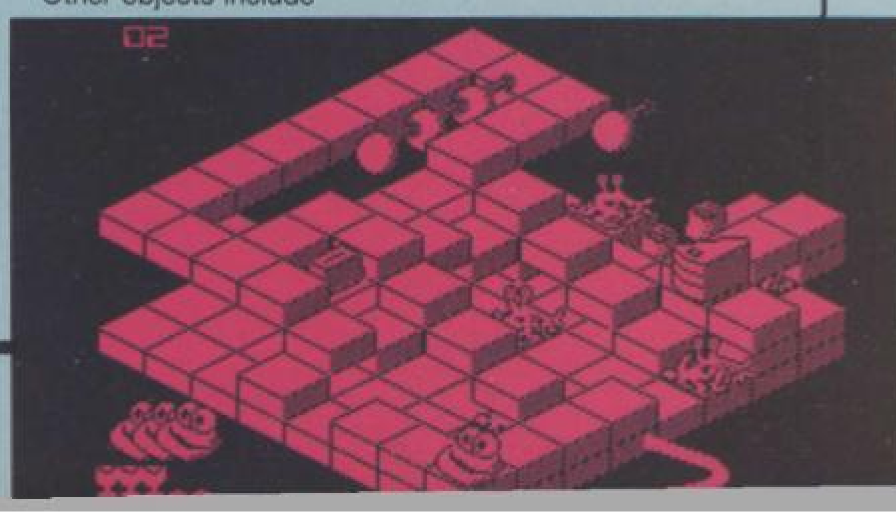
Addictive Software is big on quantity but a new release from it is usually worth a look. The last hit, *Football Manager*, is still in the charts years after its first appearance.

Kirel is, at first sight, yet another 3D isometric arcade adventure but the more you play it the more you realise it has that little spark of originality and charm which can make a game stand out from the crowd. The eponymous Kirel is a jolly, slightly-squashed-looking character who has trouble with stairs. He can slide up only one level at a time but he has the useful ability of being able to swallow parts of the landscape and regurgitate them elsewhere. In that way, our hero can tackle huge mountains.

The reason for the little chap clumping around the place is to defuse a few bombs left lying carelessly round the screen. Naturally they are time-bombs and the fuse is running low. Defuse the bombs and it is on to the next screen. Do that 70 times and you have cracked it. Your bonus depends on time taken.

Also on the screens various nasties will try and sap your stamina by the ungainly tactic of sitting on you. You can squash them if you have eaten enough cake lately – presumably that makes our flabby friend heavy enough to inflict lasting damage.

Other objects include transporters for rapid movement around screens, invisible walls, sweets to build your energy and arrows which allow you to build bridges. All that variety gives plenty of scope for fiendish logical puzzles which must be solved against the clock. Not exactly Alien 8 but great fun all the same.



BUDGET SOFTWARE REVIEWS

RAGING BEAST

► CBM64 ● Firebird ● Action ● Peter Luke ● £1.99



OVERALL ● ●

While it may be tempting to describe *Raging Beast* as a load of old bull, the game at least has some redeeming features which give it limited appeal.

In play, you have control of a matador doing mortal battle with Alfonso the raging bull. You must make as many passes at the poor animal as possible, waving your red cloak in the process.

Some amusing graphics are the only feature of the game which make it worth even the budget asking price.

SOLO

► C16 ● Bug-Byte ● Shoot-'em-up ● Peter Luke ● £1.99



OVERALL ●

The shoot-'em-up game has come a long way since the early ZX-81 incarnations of the blast-away-at-the-space-invaders-for-all-you're-worth programs. To judge from *Solo*, though, the art of programming this type of game has been put back by five years.

You are in control of a spaceship which can be moved in two directions while firing waves of missiles straight up into space. Predictably, waves of alien craft swoop down from the top of the screen firing at your vessel.

Suffice it to say that you can achieve high scores simply by sitting at the bottom with the fire button held down.

SPIKY HAROLD

► Spectrum ● Firebird ● Platform ● Lee Paddon ● £1.99



OVERALL ● ● ● ●

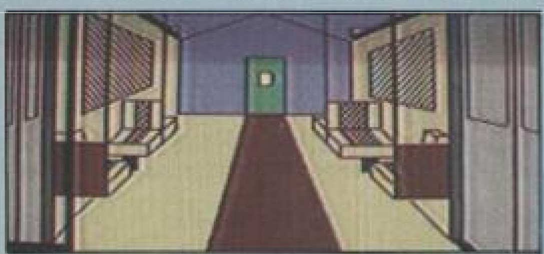
Spiky Harold has had enough of the English weather and has decided to go into hibernation. Your task is to guide Spiky through the 57 chambers which contain food, coins and wine, all of which he will need to survive the winter in his home cavern.

On the journey through the caves, Harold must battle with various obstacles, all of which will cost him one of his 20 lives should he bump into them.

A budget-priced platform game which offers excellent value.

SEABASE DELTA

► CBM64 ● Firebird ● Adventure ● Peter Luke ● £1.99



OVERALL ● ● ●

As Ed Lines, a famous reporter, you are in trouble, deep under the ocean. Ed is trapped in the submarine Sea-Lion which has been captured by enemy agents and is now imprisoned within their high security base.

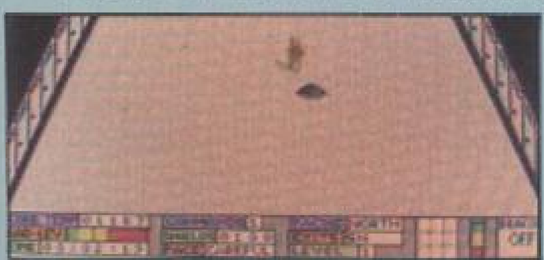
Your mission, should you decide to buy the game, is to discover the secrets of the base, locate a mini-sub and thus make good your escape.

This text-based adventure game is supplemented by simple graphic representations of the adventure locations.

An adventure which is reasonable value considering its price.

COUNTDOWN TO MELTDOWN

► CBM64 ● Mastertronics ● Arcade Adventure ● Lee Paddon ● £2.50



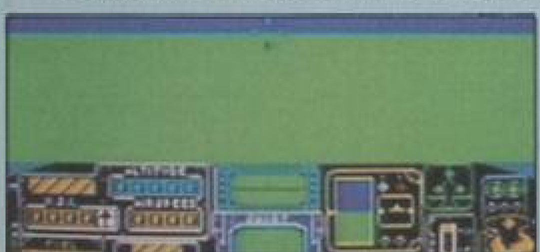
OVERALL ● ● ● ● ●

Doubtless this is another game at which people will look as a paragon of bad taste and bad timing. You have to prevent a nuclear reactor blowing its top. The robots in the plant designed to protect it from saboteurs have gone berserk. Your team of anderoids must go in and work their way to the reactor room.

The graphics are rather pretty, with a huge number of rooms. It is a good combination of shoot-'em-up and strategy. Each member of your team has different characteristics which you must exploit to reach your goal.

DELTA WING

► Spectrum ● Mastertronics ● Simulator ● Lee Paddon ● £2.50



OVERALL ● ● ● ● ●

Pleasant pilot animation, good wire frame perspective graphics of the enemy aircraft, but there is one aspect which makes this game exceptional for every Spectrum owner – two-player mode. With two Spectrums with Interface 1, strap yourself in and prepare for hours of stomach-churning fun.

Completely hidden from your opponent, you invent new manoeuvres, he invents new countermoves. Climb, dive, brake, turn – you will not be able to put this game down.

If you and a friend have Interface 1, this program is one you will not want to miss at this give-away price.

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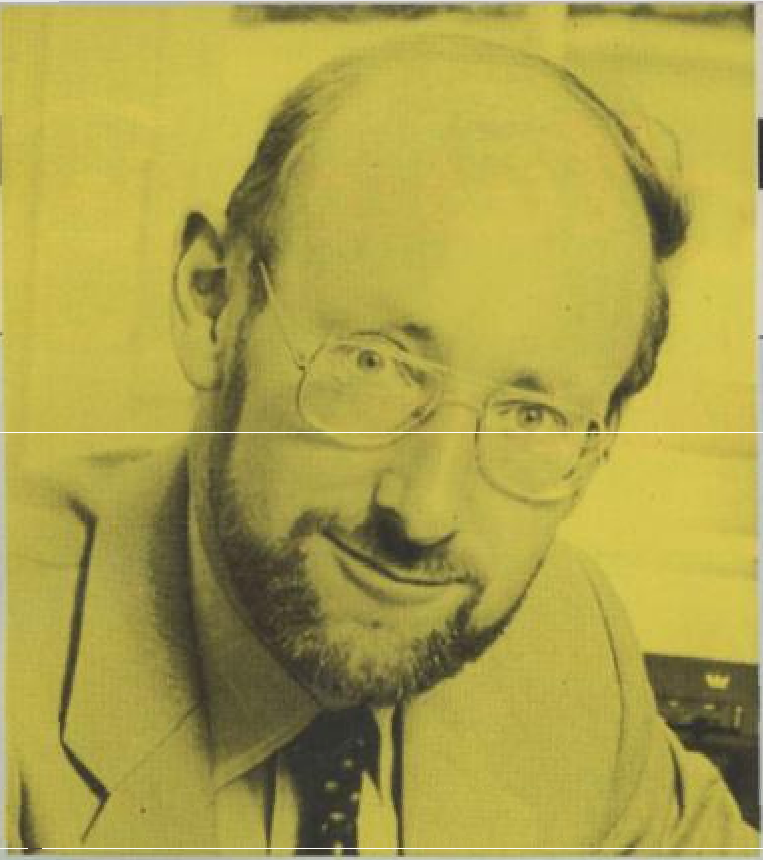
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Sir Clive bows out – but the Spectrum lives on?

In the long long and distinguished career of the Spectrum, it has attracted almost every conceivable piece of hardware a home user might be expected to buy for his personal micro. The only gaps in the list are in scientific/industrial applications and, regrettably, in the new neswpaper-designer packages such as *Fleet Street Editor/Page-Maker* which require both a hi-res screen and efficient disc-based file access.

Sir Clive Sinclair would probably have supported the Spectrum in some form or other until the end of the century; Alan Sugar may phase it out after the Christmas of 1986 has exhausted present stocks. If you already have a Spectrum, there is no reason to stop adding to your own personal collection of 48K software and hardware – the majority of products available offer value and the Amstrad take-over will probably blow the dying branches from the Spectrum tree anyway. The Spectrum will always be worth keeping as the second machine in a two-computer household – the Mini Metro of the U.K. computer scene.

Taking the decision to buy a new Spectrum will be difficult until Amstrad makes some clear statement of intent by announcing the Christmas prices of the two models. The existing Spectrum 128K at £99 would sell well; so might a Spectrum 128/datacorder/joystick configuration at £130. Interesting ploys would be to release a twin-Microdrive Spectrum using QL cases, or a new CPC464+ which has a Spectrum mode. Speculation is an enjoyable but fruitless exercise.

Amstrad will look at the international market, at the quantity of Sinclair chips in stock – ROMs and ULAs – and at the price of memory chips and make a decision on the basis of an accurate computer-generated sales forecast. If that decision bankrupts a few peripherals manufacturers and a few software houses, that's life.

In this month's special supplement we look at selected Spectrum peripherals, some of which are old favourites – many broke new price barriers when they were introduced – and some of which are relative newcomers. It is to be hoped that peripheral manufacturers will not now abandon the Spectrum but will continue the Sinclair tradition of producing goodies which are both affordable and innovative.

The Sp the ha softw

Spectrum accessories are in three categories. First there are those peripherals which, like the Centronics parallel interface and the joystick interface, are needed to bring the computer up to the specification of its rivals. Also in this category are simple items like an ON/OFF switch in the 9V power lead or, more expensively, a new keyboard. Second, there are peripherals such as joysticks, sound synthesisers, voice synthesisers, disc drives, robot controllers and so on. Third, there are the Sinclair experiments – the ZX printer, Interface 1 with or without Microdrives, and the now-defunct Interface 2.

The ZX printer was adequate at a time when real printers cost a great deal of money. It is out of production now but, even when still officially in supply, it was eclipsed by the Alphacom thermal printer. Alphacoms can be bought for around £30-£40 now and, like the ZX printer, they run on all Spectrums without the need for an interface. Interface 1 sits under the computer and is needed to run one or more Microdrives. As a bonus it gives an RS232 interface and a networking facility.

Microdrives

Microdrive cartridges give 80K of storage for £1.90 and as such represent about the most expensive magnetic medium in the computer business. The more recently-produced Microdrives are very reliable; there never was any question of poor design philosophy with Sinclair's beloved Microdrives – it was just that quality control in the early days was poor. Interface 2, on the other hand, was virtually a non-starter and was killed-off by a cheaper competitor. Today, if you want a dual-joystick interface with a ROM-port facility, you would buy the popular Turbo joystick interface from RAM Electronics.

It is very important, especially if you own a rubber-key Spectrum, not to add too many peripherals to the computer. Those Spectrums have memory chips which draw more power than their present-day counterparts and, if Interface 1 is also connected, the computer is running at full stretch and has no power to spare for peripherals. There is also the physical problem of interlocking all units and the software problem of selecting peripherals with addresses which do not clash with one another. Look then for peripherals which have more than one function so that you can reduce the difficulties.

Joysticks

All accept joysticks with the standard 9-pin D socket and most now read the stick on port 31, which is the address used by most software manufacturers but not the protocol used by Sinclair/Psion. Hence the need for the programmable interface, or the switchable interface. Prices range from £6.99 for a single-standard, single-joystick interface to £19.95 for switchable types. The Datel switchable at £9.99 is the cheapest available at the moment and the Nidd Valley programmable has a slow-motion control device built into it, which can be a very useful feature for games players.

Printer interfacing, like joystick interfacing, has its problems. The Interface 1 RS232 serial interface will not drive a printer directly since there is no suitable software in the Interface 1 ROM, so once again the independent

Spectrum, all ardware and ware you'll need

manufacturer has produced the necessary hardware.

Features to look for are a switchable parallel/serial option, software in ROM which is available at switch-on and which takes few bytes from RAM, and a bit-image screen-dump facility. Popular makes are the parallel dK'Tronics and Kempston. Other makes may still be available – there was once a plethora of them – and in all cases you should ask for a full specification to make sure it will run your printer and interface with the software you use.

Screen dumps

Prices start from £29.99 but there are combination devices which might suit your needs better. The Rotronics Wafadrive – around £80 – has parallel and serial printer ports while the Konix Liberator – £35 – has a repertoire of parallel and serial printer ports, dual switchable-protocol joystick ports, a slow-motion control and ON/OFF re-set.

Top of the range at £150 is the Opus Discovery which has a parallel printer port. It also has a 250K 3.5in. disc drive and a joystick interface and its own power supply, so if you feel you can add a £150 peripheral to a £150 computer, it is the one to choose.

Having kitted-out the Spectrum at some expense so that it resembles a real computer, the next step is to stop playing games on it and to do something more constructive. There are plenty of serious applications for the Spectrum. It brought us the first low-cost introduction to the languages Micro-Prolog and C, which hitherto had to be learned on expensive computers. Logo, Forth and Pascal are also available.

Most people's idea of creativity is not delving into artificial intelligence on Micro-Prolog – it is designing something pretty on the screen or making micro music. The Spectrum range, with a little help from the 128, supports art and music packages as good as you will find on any computer with a similar screen resolution and a similar sound chip. Add-ons figure large in the best packages; you cannot really draw without a mouse or a light-pen.

Mouse on a lead

The Spectrum mouse interface from Kempston is an example of one such creative product. The hardware consists of the black box interface and the mouse on a two-metre lead. The mouse is a good one, using a rubber-cover ball bearing of generous dimensions. It gives pixel accuracy on the Spectrum screen, provided you have a hand which is steady enough to move the mouse pixel by pixel.

The X and Y co-ordinates of the position of the mouse are obtained directly by reading port addresses 64479 and 65503. That can be done in 48K Basic or in 128K Basic. The *OCP Art Studio* software with the mouse not only shows the mouse to its best advantage but also demonstrates the excellent results which can be obtained on the humble 48K Spectrum. The program is not yet designed for the 128K mode Spectrum but will run satisfactorily in the 48K mode of that machine.

OCP Art Studio is one of the best artist programs I have seen for the Spectrum. Its working screen is uncluttered – only two lines are used for the menu titles – but the pull-down menus and sub-menus are comprehensive.

The SHAPES menu supports points, lines, continuous lines, rectangles, triangles, circles and rays, all of which with the exception of point may be used in elastic mode, i.e., you can see the effect of your planned shape before you commit yourself to drawing it permanently. The PAINT menu gives pens or erasers with 16 sizes of nibs, brushes with 16 user-re-definable images, and a spray can with eight nozzle sizes.

Rotronics Wafadrive – mass storage and printer ports.



The ATTRIBUTES menu deals with colours and effects such as the Spectrum over and inverse instructions. FILL has a menu box of its own and texture fills are well-supported with no fewer than 32 user-re-definable textures. Fill is fast and you can reverse the effect if you do not like the results. Any mistake you make on the screen usually can be reversed, since the program constantly saves the screen somewhere in RAM every time you change a method of drawing.

The user is not aware of that happening but please, OCP, can you explain where you found all the memory space to save whole screens, bits of screen beneath menus, and vast databanks of brush shapes and texture patterns in a 48K Spectrum? Picture reduction, enlargement and distortion is supported and there is an excellent picture-magnify facility to allow finely-detailed work to be achieved.

Doodler

Following close on the tail of the Kempston Mouse/OCP is the inexpensive F E Electronics Doodler which uses the light-pen method of drawing on the screen. To Doodle at the moment you will need a Spectrum 128 – the light-pen grabs the video-sync signal which the 128 gives out but which is difficult to obtain on other Spectrums. Locking-on to that signal ensures the pixel accuracy which other light-pens, with the exception of the dK'Tronics Mk. 4 pen, fail to achieve

Doodle has an accompanying drawing package which is strong in freehand drawing, background painting and pattern placing but it does not support picture reduction/enlargement or elastic patterns. Remember also that, unlike the mouse, no light-pen can draw on areas of screen which are already darkly-coloured or inked-in. Doodle is menu-driven and selecting options using the light-pen is a doddle, or possibly a doodle.

Continued on page 52



Interface 2 – the market fell apart as easily as the product.

Continued from page 51

Musicians who own Spectrums had a frustrating time until Cheetah released *SpecDrum* which, for £30, turns any Spectrum into a drum synthesiser equal in performance to professional equipment costing many hundreds of pounds. Spectrum is capable of generating eight drum sounds – bass, snare, mid tom, low tom, cowbell, Hi-Hat closed, Hi-Hat open and claps, three of which can be sounded simultaneously.

Overlay software, bought as a separate tape, gives an alternative drum kit of eight sounds with Lo and Hi timbales replacing the Toms and Cabasa and Tamborine replacing the Hi-Hats. The design of rhythms – called patterns – and the grouping of rhythms into sequences – called songs – is menu-driven and virtually idiot-proof in operation. The patterns are laid down in a sound editor which is the drumkit equivalent of a word processor, or can be tapped-in live from the Spectrum keyboard.

Partly-made patterns and partly-composed songs can be replayed at any time and part- or wholly-finished work can be saved to tape. What elevates SpecDrum to professional status is its ability to lay down timing blips on the cassette – or spool – recorder and, later at playback, lock on to the blips and synchronise new drum sounds and patterns with those already recorded.

SpecDrum, however, in common with 95 percent of all Spectrum hardware, does not recognise the Spectrum 128 and therefore you should not expect it to tie in with the 128 three-channel sound chip. You can run SpecDrum on the 128 but only when it is in 48K mode.

Music programs for the 128 are thin on the ground at the moment. Melbourne House has issued *Wham*, the music box, so you can listen to six Wham songs if you feel you must, and compose your own tunes as stand-alone masterpieces or for inclusion in your programs. Rainbird is working on *The Music System*, a menu-driven composer, but plans for its release may, of course, be affected by the Amstrad takeover.

As for musical hardware, there is little available at the moment. HCCS will supply a three-octave, full-size piano-style keyboard which will, aided by some tape software called the *Echo Music System*, drive the 128 sound chip. The 128 has a Midi port but no software house has bothered to use it yet. You can, however, have Midi on any Spectrum.

Midi system

XRI Systems markets the Micon interface which links any Spectrum to one or more Midi synthesisers and, for £100, it turns the computer into an eight-track 2,900-step sequencer with an on-screen music score displayed in real-time. The system can be synchronised from the Midi channel, from external sync pulses or from tape blips. All compositions can be edited and saved to tape, Microdrive or Opus disc.

This all tends to be supplied on cassette, although many programs will re-locate to Microdrive standard. Users who have Wafadrives or a disc system may have to hack the program or resort to using a code-breaking utility to get the program on to their storage medium. The Spectrum never really attracted sideways ROM and there seems to be a complete absence of serious ROM software to plug into the Turbo interface and Kempston interface peripherals. Word processing utilities are supplied by Tasman, whose *Tasword WP* has proved very popular. Tasword and *The Writer* from Softek are both available in extended 128 versions.

Oasis Software has made a name for itself with its *Lightning* series of Assembler, Basic compiler, and sprite generator, now mysteriously re-named *The Magus Assembler*, the *Laser Compiler* and *Laser Basic*. The Oasis assembler/monitor package, *Spectre-Mon*, written for the 48K Spectrum and now some two years old, runs on a 128 Spectrum in 128 mode, which is amazing in view of the fact that most 48K programs do not even finish loading when the computer is set to 128 mode.

Alternative languages have been mentioned but if you want an improved Basic, *Beta Basic 3* from BetaSoft is an excellent extension to Sinclair Basic. Hackers will like the inclusion of keywords such as DPOKE,DPEEK,DEC, HEX$ while PROCEDURES and DO-UNTIL and WHILE-WEND loops will please those who favour structured programming.

List of Suppliers

RAM ELECTRONICS (FLEET) LTD
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Redfields Industrial Park,
Redfield Lane,
Church Crookham,
Aldershot,
Hampshire
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Gorleston,
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Norfolk

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Knaresborough,
North Yorkshire,
HG5 8JW

CHEETAH MARKETING LTD
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CF3 0EF

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Kempston, Beds

OPUS SUPPLIES LTD
55 Ormside Way,
Holmethorpe Industrial Estate,
Redhill,
Surrey

HCCS LTD
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XRI SYSTEMS
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Wylde Green,
Sutton Coldfield,
West Midlands,
B73 5RE

DONIX COMPUTER PRODUCTS
Unit 13,
Sirhowy Industrial Estate,
Tredegar,
Gwent,
NP2 4QZ

BETA SOFT
92 Oxford Road,
Moseley,
Birmingham,
B13 9SQ





Spectrum games from outer space to deep dungeons

The Spectrum has been the premier games machine for four years. We look at the best available for the machine.

Sinclair tells us that playing games on a Spectrum can kill you – 5,000 times. Choosing just a few favourites from that number is a tough business and it will inevitably be a rather personal choice. So if your favourite is not here, our apologies.

In the beginning there was *Ultimate*. Reeling-off the list of titles from the boys from Ashby is like a Spectrum hall of fame – *Psst, Cookie, Sabre Wulf, Atic Attack, Knight Lore* and *Alien 8*. All those games, in their day, represented the state of the art in games design. In every case, each game spawned a host of imitations.

Knight Lore and Alien 8 are, for most people's money, the best of their kind. Knight Lore even exploited the Spectrum's notorious dot crawl to artistic effect. Alien 8 must be one of the most satisfying games to solve. Virtually every room is an intricate puzzle. At first, seemingly impossible, but after you have cracked it you wonder what the fuss was all about.

Others in the hall of fame must include *Manic Miner* and *Jet Set Willy*, both from Software Projects. At the time *Manic Miner* appeared, there was nothing to match it and it really set the arcade/platform bandwagon rolling. A further development was the *Wally* series from Microgen. It introduced problem-solving into the arcade game and the true arcade/adventure was born.

A controversial game from around the same period was *Valhalla* from Legend. You either love it or loathe it; it was the first in a proposed series using Moviesoft. The idea was that if you wished you could sit back and watch what happened or get involved in the environment. If Valhalla was Moviesoft's epic, *The Great Space Race*, Legend's next effort, was its low-budget horror flick and remains a byword for hype to this day.

For arcade freaks, there have been plenty of adaptations of arcade favourites. *Commando* from Elite and *Who Dares Wins* from Alligata are both no-nonesense, blaze-away games. Any game from Vortex is worth looking at, particularly *Tornado Low Level* and *Highway Encounter*. Both feature tough tests of reflexes, combined with pleasantly-drawn, smoothly-scrolling graphics.

If your reflexes are accompanied by a good deal of stamina, you might try

Continued on page 54

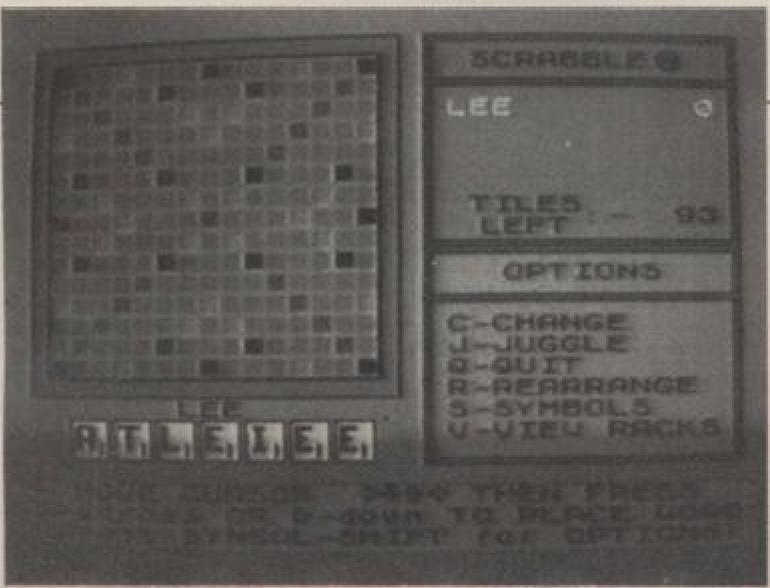
ROTRONICS LTD
Santosh House,
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Leeds,
LS2 9LN

OASIS SOFTWARE
12 Walliscote Road,
Weston-super-mare,
Avon,
BS23 1UG

sinclair special



Continued from page 53

Quazatron from Hewson. Zap, grapple and shove the anderoids around over umpteen decks teaming with the savage beasts.

Beyond, until its takeover by BT, was another Spectrum stalwart. *Lords of Midnight* and *Doomdarks Revenge* are truly epic adventures. They feature Mike Singleton's exceptional landscaping technique, allowing you to look out over the vast plains of the Land of Midnight. Both games are difficult to complete and will appeal to adventure fans and adventure phobes alike. *Shadowfire* was an icon-driven adventure shoot-'em-up. It allows you to do complex actions without resorting to keyboards and menus. There are five members of a crack and deadly commando team who have to fight their way on to an enemy ship and rescue the ambassador. Stealth and subtlety are more rewarding than just blazing away at anything which moves.

Simulators

If you want simulators, talk to Digital Integration. *Fighter Pilot* was a revelation when it was released nearly two years ago and has the market virtually sewn-up. Your F15 has to defend five bases against marauding enemy fighters. It is a highly-demanding game to play. You must intercept the enemy, then drop on his tail, then keep him centred while you close down the range. Patience is needed; if you are too impatient, you will overshoot. Then all you have to do is spot a gap in the enemy raiders and do a fast landing, re-fuel and start all over again.

A difficult act to follow but Digital did it with *Tomahawk*. Now your enemy is on the ground as well as in the air. All the performance characteristics of the real thing are there. You soon learn that victory rolls in a helicopter are not a good idea. It is also one of the most playable simulators, with warning buzzers and auto-stabilisation.

Although not a true simulator, *Combat Lynx* from Durrell was an excellent game. You must defend your bases using mines, rockets and guns. The ground-contouring technique used was highly effective. You really had the feel of hugging the ground. It is not a simulator – you tell your helicopter to turn or climb and it does so. It is, however, more than a shoot-'em-up. You can just blaze away at the enemy until they inevitably over-run your base, or you can "manage" the battlefield, moving troops around, ferrying back wounded and laying minefields.

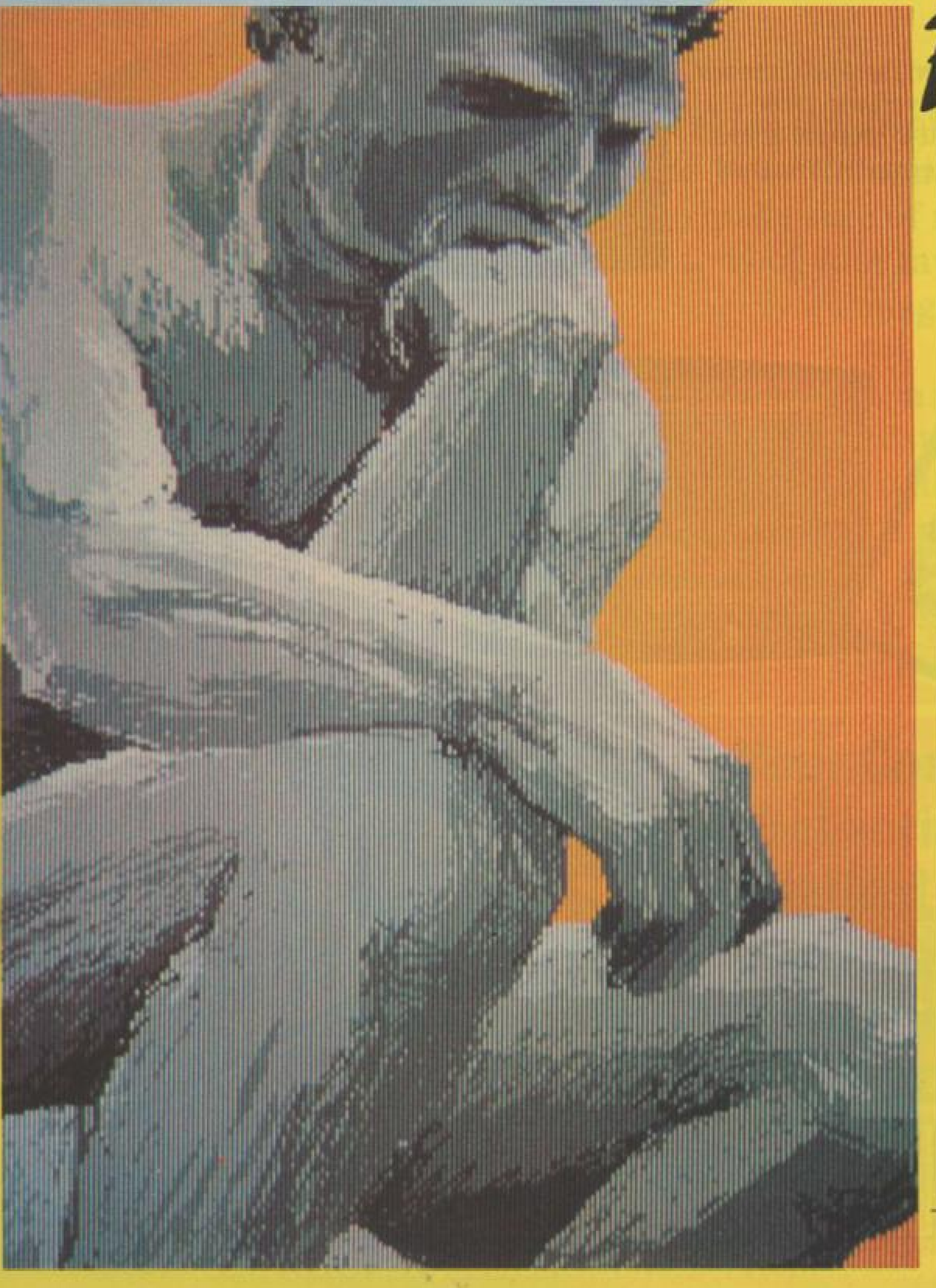
War games have been around on the Spectrum for some time. Lothlorian, through Argus Press, has a large range but the current state-of-the-art game is from CCS. *Desert Rats* is simply head and shoulders above the competition.

Every time one of these games appears, it was thought "surely this is it, they can't squeeze anything more out of this thing", but every time we have been proved wrong. What the future holds can only be speculation.


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Packed with all the action and atmosphere of the movie, Biggles is a multipart game that'll keep you on the edge of your seat right to the end of your mission.
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AMIGA

Amiga – the future is



Promising. If I had to use one word to describe the software I have seen so far for the Amiga that would be it. As yet nobody, and I mean nobody, has used all the facilities of this incredibly powerful machine. The software you can see on these pages is technically excellent but in two years we will start seeing what the Amiga can really do.

Commodore, in all its wisdom, however, decided to market the Amiga; I hope that people see it for what it really is – potentially the most important micro this decade. Unlike anything which has gone before – and that includes the Macintoshs and 520STs – the Amiga is no ordinary home micro.

Programmed well, the Amiga can create graphics of a standard associated normally with £10,000 computer-aided design machines and stereo sound equal to many dedicated synthesisers.

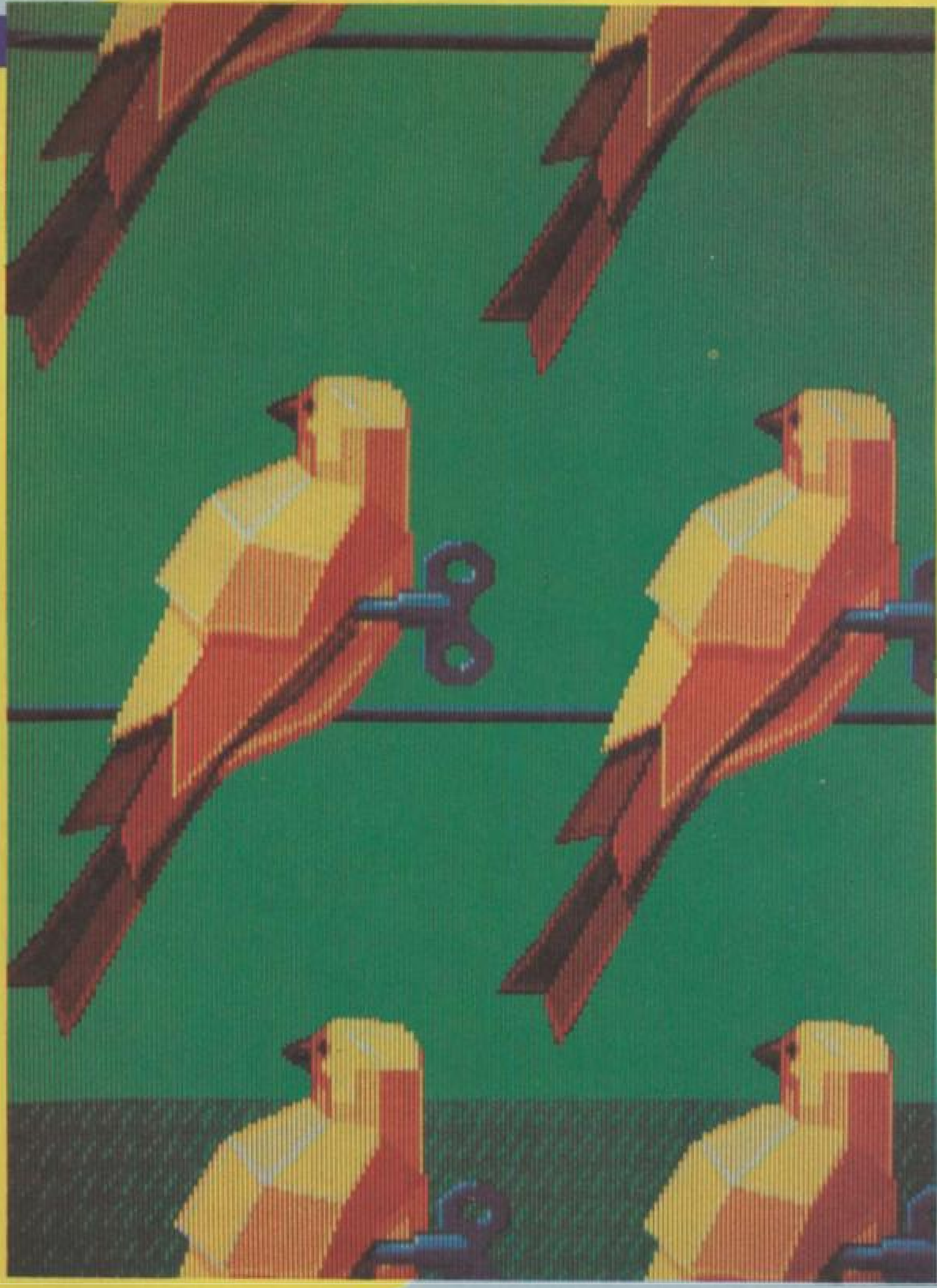
Deluxe software

Of the software available, most is programmed by American software houses which were provided with a black box by Commodore and have therefore had almost a year to perfect their products.

One of the first, if not the first, piece of software was *Deluxe Paint* from Electronics Arts; and in many ways nothing since has managed to achieve so much. To describe it as just a graphics package is rather like describing a Porsche as just a car. When compared

The full potential of the Amiga has yet to be realised. The initial software launches show what the machine can really do. Francis Jago reports.

is here



to any similar package on any other micro, it puts them to shame.

Deluxe Paint built-in facilities allow you to draw in any of the three Amiga resolutions – low (320x200, 32 colours), medium (320x400, 16 colours), and high (640x200, 8 colours). Once you have decided in which mode to paint, you are free to use all the facilities Deluxe Paint provides, and that includes the pre-set brushes, zoom, text – in a variety of fonts – filled and unfilled shapes, curves, and some amazing bend, stretch and smear techniques.

Craft work

Perhaps the most remarkable feature of Deluxe Paint is that it allows you to create a brush out of whatever you wish. That means you can pick up a section of a picture and then draw with it. As well as draw with it, you can alter the brush shape, angle and virtually anything else your imagination could want. Try doing that on a Spectrum 128 or Amstrad.

Even Deluxe Paint could be improved. It was written in C and is therefore slow at extremely complicated mathematics routines, but at least it can do them, because of the power of the Amiga 68000 processor.

Commodore has produced three pieces of software for the Amiga, *Textcraft, Musicraft* and *Graphicraft*. Textcraft is an entry-level word processor which uses the mouse to increase its attractiveness but it cannot really be described as comprehensive. Musicraft is an excellent music package which combines the stereo capabilities of the Amiga with ease of use to produce a really complete package.

Music samples

Although not finished yet, Musicraft allows you to load and save tunes, play in real-time, and alter the sound waveforms. When I first heard the stereo version of Axel F, using sampled sounds, even an Amiga afficianado like me was truly amazed.

Graphicraft is the Commodore art package which, although very good, has been over-shadowed by the much more complete Deluxe Paint but all pictures produced on Graphicraft can be loaded into Deluxe Paint, as they share the same graphics format.

IFF Aegis is the only other software house to have developed a package which lets the non-programming user grasp the true potential of the Amiga. Called *Animator*, it allows you to create a sequence of frames and then, as its name suggests, animate them. Included in the package is the graphics program, *Images*, with which you paint the pictures you use in Animator. If it sounds complicated, it is not, and in less than an hour it is possible to concoct a very reasonable sequence.

No article about Amiga software would be complete without reference to the games available and, in particular, *Articfox*. Most games are just conversions from 64 games, with minor graphical improvements. Articfox, however, is a 3-D battlezone-type game but with filled-in graphics of amazing quality. That, together with *Marble Madness*, when it is finally released, should prove to any doubters that the Amiga is potentially better than an arcade machine.

Overall, the Amiga is as amazing as everyone has said but at around £1,200 it is by no means priced to be a home computer. So far, only some of the software has showed what the machine can do; with more products as good as Deluxe Paint, I do not see how the Amiga can possibly fail – but don't quote me.



Up to 64 Nimbus computers may be combined in a network system.

Research Machines Ltd. is one of the unsung heroes of the UK computer market. They have long been active in the educational market and their Nimbus computer aims to appeal both to educational users and to the business sector

Nimble 16-bit RML Nimbus

by Geof Wheelwright

Research Machines Ltd is not a name which normally crops up in my dreams but after having looked at its Nimbus machine I am still having nightmares about the day it was taken back from me.

As the company name implies, RML has long been active in the research and educational computing markets and you may well have seen its RML 380-Z and RML 480-Z computers in schools. The new high-speed 16-bit Nimbus is both like and unlike the rather staid 'Z' machines, which have no place in my dreams except to put me to sleep more soundly.

Although the Nimbus is like the older machines in that they have consistently been configured to offer business operating systems such as the Digital Research CP/M and Microsoft MS-DOS and business software such as the Micropro popular Wordstar word processor, they did not use a mouse, run under the Microsoft impressive Mac-like Windows environment and run at a speed which would impress Zola Budd as the Nimbus does.

The Nimbus, however, a little sadly, has one feature which makes it a slightly less desirable than any of its ancestors – it is much more expensive. The latest RML computer is aimed squarely at the business computer market, featuring a high-speed IBM PC-type microprocessor – the Intel 80186 – MS-DOS, networking capabilities, mouse operation, 3.5in. disc drives, internal hard disc capability and Microsoft Windows graphic operating environment. Those features give the system a performance level and specification offered by few other business PCs.

The only close competitor in specification is the Apricot XEN computer, the subject of a future dream sequence, which also uses a high-speed Intel processor, 3.5in. disc drives and Windows. These are, however, only superficial similarities, as the two machines are attempting to do two different things. The Apricot machine is directed at bringing together the best of existing Apricot PC, IBM PC and IBM AT technologies in a box which offers a certain degree of compatibility between all of them, while the Nimbus seems more directed at starting with a fresh design which makes the most of exciting state-of-the-art business computer technology.

Multi-tasking windows

The most immediately impressive feature of the Nimbus is the Microsoft Windows software which is bundled with it; it is like the Apple Macintosh, except that the designers have gone one better by adding a multi-tasking feature which means that you can run a number of programs at once.

The Write word processor, for example, can be on-screen at the same time as the Paint painting program – I can credit Microsoft for a good deal but not in how it names its software – a calendar program and more.

This is possible, first of all because the Nimbus uses the 80186 processor, a much faster version of the 8088 processor family used in the IBM PC, and includes plenty of RAM. The test dream machine had 576K of RAM and a hard disc, so there was plenty of room for both applications and data.

Expensive dream

The second reason why Windows is possible and highly-attractive on the Nimbus is because of the way Windows handles disc and memory. Because you may want to run only a single application, or alternatively a number of applications at once, Windows has to be flexible in how it allots RAM. So what happens is that when you run only one application, Windows will operate mostly in RAM, but as more applications are loaded into the Windows desk-top, the operation of those programs switches to disc, so that the programs use only as little memory as they need to do.

That means that even with a mere 512K of memory, you can run several powerful applications at once under Windows and still have room to manipulate a considerable amount of data.

Even without Windows, the Nimbus would still be very impressive. The graphics and sound demonstrations with our review machine were spectacular, as they should be, since the machine has an RML-designed dedicated fast graphics processor, an 8051 peripheral processor running at 1MHz to speed general operations, and a dedicated 8910 music chip. It can also use the RML network, Piconet, with up to 30 stations and four high-speed bus slots.

The only difficulty about using this dream machine was waking to find that I did not have the money – £1,800 for a Nimbus with twin disc drives and 576K RAM – to buy one.

Mightier than the pen?

Recently we saw the first issue of a new user-group magazine, Word Processing, aimed at all users of word processors on home computers. Liking what we saw, we arranged with the editor, Paul Hendy, to reproduce some of them for your benefit. To start the series, here is an introduction to word processors, explaining why there are so many types and how useful they can be.

What is a word processor? Why spend perhaps hundreds of pounds on a system for a task which can be done by an old typewriter now gathering dust on a shelf? Surely that same entry of text has to take place and, provided you are careful, the result will be satisfactory?

So must have spoken many people not familiar with word processors – and it is essentially correct, provided you are careful. It is a very rare person who can type some text with all the indents correct and right margins straight, so for the vast majority of people, a word processor is irresistible.

A word processor is at its simplest an electronic typewriter but using no paper initially. The characters are displayed on the computer screen as they are entered from the keyboard. When checked it is then printed-out. It is this division into two parts between the creating/editing of text and the printing which provides the breathing-space during which any mistakes can be corrected and the layout of the text be modified and improved.

Assume for a moment that you sit at the keyboard and type-in sentence after sentence until, e.g., your letter is finished. As you enter the words, you will probably see part of a word jump down a line as it tries to go beyond the right margin. On a typewriter you would by then have heard a bell to warn you of the line end and you would need to push back the carriage, moving the paper up a line.

With a word processor you continue typing, not worrying about where the end of the line is, because the computer knows, and usually executes a word-wrap function. It knew that the word you were part-way through entering would not fit on to the current line, so it caused the word to jump down to the beginning of the next line, often adjusting the line just finished so that its right margin is straight.

If you then read through the text you have entered, you will almost certainly find paragraphs which would read better if they were somewhere else, and some sentences which could be deleted altogether. The analogy of a newspaper editor is often used, whereby text is cut, copied, or pasted. A sentence is marked and then cut out of its present position, and either pasted somewhere else or thrown away.

If you want a copy of that sentence to appear in two places, it is photostated and then pasted into the required locations. The computer performs operations in very similar fashion, storing the sentence in memory and then moving, deleting or copying it somewhere else.

Text manipulation

The manipulation of blocks of text saves hours because if required, each block, e.g., a standard paragraph in a business letter, can be saved on disc and then loaded as necessary into a document, so that it does not have to be re-typed time and again. To be able to save a document, on disc usually, or tape means that you can return to it at some future date to continue and, if necessary, the document can be recalled and edited for some similar purpose.

Imagine, for example, the preparation of a paper for a meeting, having it modified, and then being required to produce the revised version at another meeting the next day. That would require much midnight oil using a typewriter but with it stored as a file on disc, recall is extremely fast – a few seconds at most – and then only the paragraphs requiring change are altered, before reprinting the final version.

On error goto

Looking for errors, you can move the cursor on the screen, normally a white/black block or a flashing line, to the offending letter and then delete it and insert the correct character, or over-write it with the required letter. The latter option is often quicker, because the computer deletes the one character as it types another, but it must be used with care or you might forget to turn off the over-write option and start deleting wanted text.

Word processors normally will have the option of replacing words with new characters, so that, e.g., a letter originally to Acme Business Systems can have all references changed to Bloggs Computer Industries with the minimum of fuss if there is a takeover. Those replacements normally can be performed either globally, i.e., all references found and changed automatically, or selectively, whereby a check is made for each one.

If you look at a professional document you will notice extra features which are not normally found in home-typed text. Often the head of each page has a title and the foot has the page number printed. They are inserted automatically by the computer and are known, somewhat imaginatively, as headers and footers. Once defined, they do not have to be re-typed for every page and their position can be pre-determined, normally centred on the appropriate line.

More sophisticated systems will allow, e.g., two header texts, which will swap position on the top of the page, right to left and vice versa, depending on whether the page number is even or odd, a convention often employed in books.

TAB performs the same function as its typewriter counterpart, namely to indent a line by a certain number of spaces and, like a typewriter, the position of the TABs can be pre-set for the aligning of columns, but word processors will also allow you to indent complete para-



graphs to draw attention to them.

The right margin can be adjusted like this paragraph, and text can be aligned to this margin, called right justification. The computer automatically adds spaces between words to make them fill the line to get a straight right-hand edge; this can sometimes look less personal, so there is usually an option to turn off the facility.

Give us a break

The computer knows how many lines of text have been entered and therefore where the page-breaks will occur, sometimes in very awkward places. Think how annoying it would be if a page-break occurred halfway through a tabulated set of figures, so there is a facility known as conditional page-break, by which you can tell the system to start on a new page if there are fewer than a certain number of lines. Consequently with a column of 15 figures, you would set a conditional page of 15, so that if there is fewer than that amount, the whole set will be printed on a new page.

Getting what you see

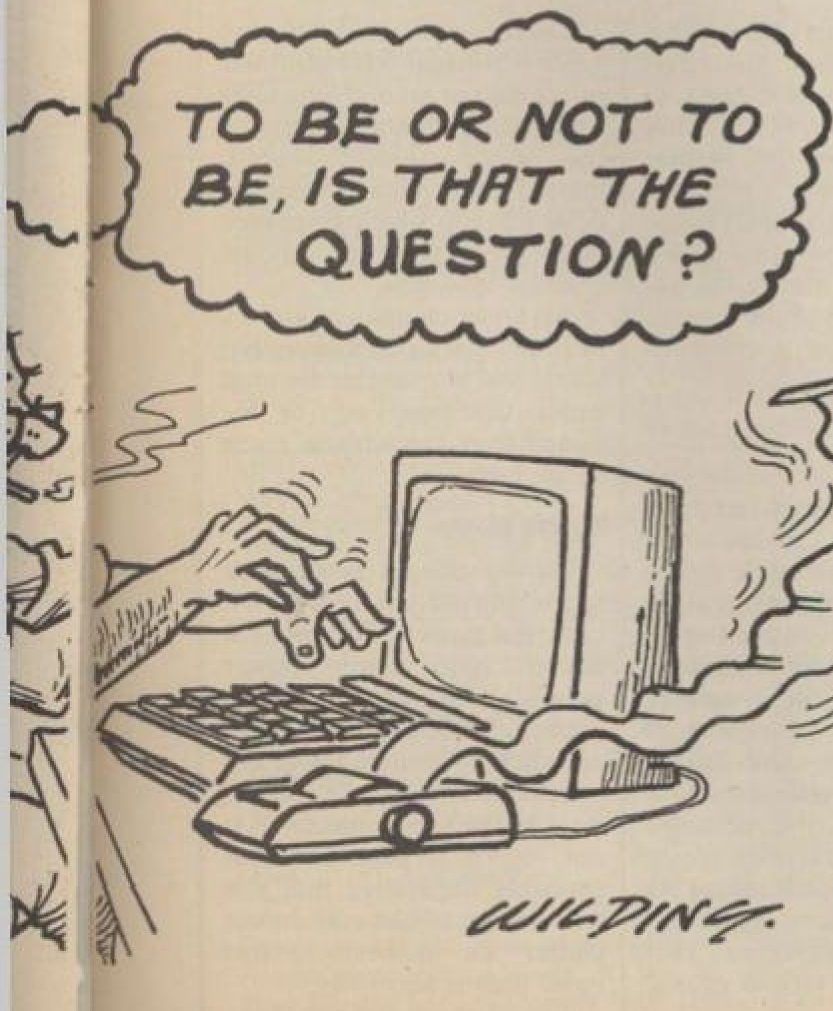
Most of the features described can be found on the well-known word processors but it must be realised that there are, broadly, two main types of system, the distinction being whether it is WYSIWYG or not. That acronym stands for What You See Is What You Get. As most printers and monitors produce 80 characters per line, it is possible to design a word processor which will format your text as you enter it so that you can see exactly where the line/paragraph/page breaks are. WordStar, View, and Locoscript would claim to be WYSIWYG.

Wordwise and Wordwise Plus, on the other hand, require you to enter text using a 40-column screen with no idea of line/page breaks until you preview the text. That obviously has some disadvantages but it is liked by many because it is generally much faster – the format routines take a relatively long time – and does not require a high-resolution monitor to use it. I still believe that there is a need for a true WYSIWYG system which will display headers and footers as they occur and cater for, e.g., the insertion of very small words on a line which would, when re-formatted, fit on to the previous line and adjust automatically.

Increased capabilities

As the memory capabilities of computers have increased, so there has been the development of systems able to display different typefaces on the screen, including italic, bold, underlined. The new Apple Macintosh Plus is a good example of that type of system. Window environments and mouse controls are the vogue attachments of the moment, the latter being a small box moved round the desk-top controlling the cursor on the screen. It can then very quickly move round the text, call-up menus of options and mark blocks for text movement. The more sophisticated word processors have facilities for mail-merging, the means by which several different personalised letters can be generated using one master letter and a set of names and addresses stored in a database.

This article is intended as a general introduction to word processors, listing features to be found on most of them. Refer to your manual to learn what facilities your particular system offers.

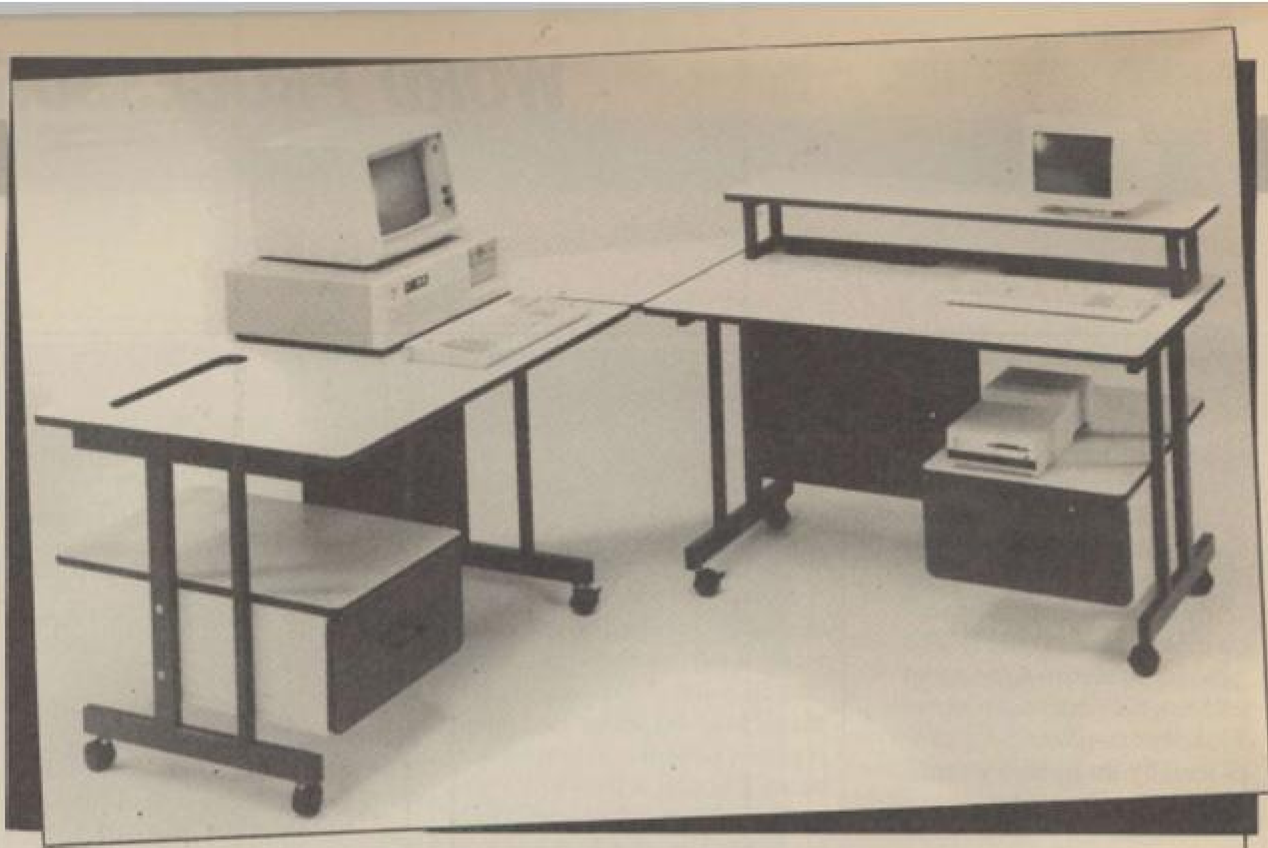


SOFTWARE	COMP	C/D/R	WYSIWYG	M/M	PRICE	COMMENT
Wordwise	BBC	R	N	N	£36.80	1
Wordwise Plus	BBC	R	N	Y	£56.35	2
Inter-Word	BBC	R	Y	Y	£56.35	3
View	BBC	R	Y	Y	£60.00	4
Wordpower	BBC	R	Y	Y	£35.00	5
Edword	BBC	R	Y	N	£45.95	6
Pocket Wordstar	Amst	D	Y	Y	£49.95	7
NewWord	Amst	D	Y	Y	£69.00	7
Protext	Amst	C/D/R	Y	Y	£39.95	8
Tasword 2	Amst	C	Y	N	£19.95	9
Tasword 2	Amst	D	Y	Y	£24.95	10
Tasword 6128	Amst	D	Y	Y	£24.95	9
Tasword 2	Spec	C	Y	N	£13.90	9
STWriter	520ST	D	Y	Y	Free	11
1ST Word	520ST	D	Y	N	Free	11
1ST Word +	520ST	D	Y	Y	£95.00	12
GEMWrite	520ST	D	Y	N	£129.95	13
Locoscript	PCW8256	D	Y	N	Free	14
M/Office2	Ams/BBC	C/D	Y	Y	£14.95	15
Easiscript	Comm	D	Y	N	£59.95	16
Tasword	Comm	D	Y	N	£19.95	9

KEY: C/D/R = Cassette, disc, ROM, WYSIWYG = see text, M/M = Mail Merge

NOTES

1. One of the most popular word processors, renowned as being user-friendly.
2. Enhanced version of the above plus a full programming language. Many programs and utility ROMs appearing for this.
3. The new ROM from Computer Concepts, linked with its spreadsheet, graphics and database ROMS.
4. The Acornsoft word processor. On-screen formatting but renowned as being rather difficult to master.
5. A new entry in the BBC market, a 16K ROM with some good features from 1-4 above.
6. Designed particularly with education in mind. Very friendly for children. Teachers' packs with OHPs available. Further enhancements on the way.
7. A battle royal between the two giants for the Amstrad market, including 8256/8512. Very similar in operation. Price comparable when spelling checkers included.
8. A ROM-based system for Amstrad 464/664/6128. Very fast, plenty of features and spelling checker now available. Price quoted for ROM.
9. Tasman has produced Tasword for most popular computers. Reliable but not exciting. Tasword 3 looks good, though. Also Tasword 8000 being planned for 8256/8512.
10. A version for the 464/664 with disc drives.
11. Both released as packages with the Atari. The STWriter as a stop-gap. 1ST Word is very pleasant.
12. The GST upgrade for 1ST Word; incorporates graphics into text and includes a spelling checker.
13. GEMWrite, similar to 1ST Word Plus in some ways. Also incorporates graphics; price rather high for home buyers.
14. Mail-merging and database facility apparently planned for later this year.
15. Database produces a useful suite of simple programs with spreadsheet, database, graphics and word processing, including label-printing.
16. Commodore is apparently not very suitable for word processing because of its screen limitations.



How can you prevent the apple of your eye turning to sour grapes? Mary Sargent lets you in at the bottom drawer and won't leave you on the shelf.

A table of tables and a load of blocks

So there you are, with new computer, the family television set, a cassette tape recorder complete with 65 assorted tapes and a random selection of tomes, each guaranteed to give you instant computing gratification, and the woman in your life asks where you think it is all going to live? You have a clear choice. Sell it all to the man next door and take up macrame; leave home; build a large extension; invest in some purpose-built computer furniture.

Depending on your finances and perceived computing status, there are several types of furniture you can choose. Bottom of the range is the good old basic, do-it-yourself-and-if-it-falls-apart-kick-it desks from MFI. They look pleasant, are in kit form, and due to MFI policy of always having some kind of sale, special offer or other loss-leading promotion, can usually be bought for between £15 and £20.

Although there are apparently several models, rejoicing in names such as Alpine and Kimberley, they are the same desk, with minor differences. Some have the monitor shelf, the main desk surface designed to take the keyboard and a telephone, with a third shelf underneath for tapes, discs and manuals. Some have castors and some have small compartments which may or may not be big enough to store half-a-dozen tapes or a few more discs. They have either a teak or melamine finish and as with most MFI put-together furniture, they appear flimsy.

Reasonable solution

MFI reports, however, that it has sold in vast quantities and, provided you can get the holes to line up properly with the relevant pegs, so that the thing fits together, they are probably a reasonable solution to the space problem, at the price. The one serious reservation I have is about the depth of the desk. It seemed to me that although the monitor shelf was at the correct height for ease of viewing, the keyboard surface was so narrow, front to back, that the monitor would be uncomfortably close to the user's eyes.

MFI desks are not alone and it is a matter of user preference. It might be as well, if it is feasible, to try a desk with a screen running before buying.

The Argos catalogue offers one or two options and, with a 16-day money-back guarantee, you can take them home and test them properly. Argos is distincly up-market from MFI, with units by Qube and Lancelot designed to look more like office than household furniture. Prices start at about double those of MFI but again the choice is limited and includes specific storage units, as well as working desks.

Her indoors

Whatever you are seeking it is sensible to consider whether your workstation is to stay in one place or whether "her indoors" is likely to evict you from your chosen resting-place from time to time. Castors become a definite factor in the equation at this point.

As size increases, so does price. All desks tend to look big when photographed with a Spectrum on-board. Shinecrest has a range of workstations, of which its model 600 at £70 has generous width and depth. Like the Qube offerings, Shinecrest uses a metal frame construction and wood grain-finish shelves. Model 450 has a four-way Masterplug fitted to it to simplify the mains leads connections.

Serious furniture

For those who are really serious about computer furniture, Opus Supplies Ltd has a full range of business-style desks, with a variety of options available. They include built-in filing drawers, monitor/printer ledges, lockable castors, specific printer tables with or without baskets and linking units for when your system expands. Clearly, the melamine and steel constructions are intended primarily for offices but for habitual users, and those who work from home, they must be worth serious consideration.

Twelve units of different types constitute the range and prices start at around only £120 for a basic computer table. For the more specific hobby market, Opus has an Organiser desk for £60 which competes with MFI and the models stocked by Argos.

All Opus equipment arrives in flat pack, self-assembly form, and is available by mail order. Catalogues can be obtained from the address given in the table.

Wrong places

Having bought some desk space, you need to consider the electrical aspect. Most modern houses have fewer power points than the electrical appliances which need them and there is an immutable law which decrees that they are always in the wrong places. It is not merely a good idea but probably imperative that you exercise great tact and do not clutter the domestic points more than is necessary

Top of the list should be a

mains multi-point adaptor. Let Amstrad users gloat quietly – they have one plug, possibly two if they have a printer, but Atari 520ST users will have five – computer, monitor, disc 1, disc 2, printer – with additional plugs for extras like modems, and each will have its own few metres of lead with plug.

Killed-off

Recent concern about electrical safety has just about killed-off the habit of plugging more than one piece of equipment into a 13-amp wall socket, which was a potentially lethal cube-shaped fitment which allowed you to overload the wall socket by some 300 percent. Computer equipment is unlikely to go past the 13-amp limit but trailing flex is a problem. The quad in-line, quad-square or four-gang trailing sockets from Duraplug and other manufacturers are safe but chunky, and smaller versions which do not use standard three-pin plugs are becoming more popular.

The NuWay from Masterplug is a four-way socket and Selmar markets a six-way version. Prices start at £7. At the wall-end of these multi-sockets you might consider fitting a residual current circuit breaker, now more popularly known as the power-breaker plug, which prevents electrical shocks. BBC users who run their machines with the lid off while drinking endless cups of coffee doubtless will be aware of the potential hazards of life at the computer keyboard.

Polluted power is another hazard, safe to human operatives and deadly to computer software. There are now power cleaner plugs available which will prevent electrical noise from freezers and the like reaching the sensitive micro. Power breakers cost around £18, power cleaners start at £10.

Finally, for those who live high on the moors, or anywhere where the National Grid is temperamental, there are uninterruptible power supply systems which guarantee to keep your micro running for hours during power black-outs, as well as suppressing spikes and surges on the line voltage.

ELECTRONICS TABLE
DISTRIBUTION BLOCKS

Make	Computer end	Via	to Household Mains	Style	Comment	Price	Notes
Volex	4-way socket, neon	3' flex	13amp fused plug	Square block	—	£8	
Selmar	4-way socket, neon	3' flex	13amp fused plug	Square block	—	£7	
Kambrook	4-way socket —	3'flex	13amp fused plug	In Line	—	£7	
Duraplug	4-way socket, neon	—	—	In Line, fused	—	£7	Note 1
NuWay	4-way "Masterplug"	3' flex	13amp fused plug	In Line	4 small plugs also supplied	£9	Note 2
Selmar	6-way	6' flex	13amp fused plug	In Line	6 euro-plugs also supplied	£12	
RME Powerpoint	4-way socket, neon	3' flex	13amp fused plug	Square block	Includes mains filter	£. .	
FILTERS							
Make							
Radio Spares	238-665 Surge-Protection plug				Various other makes available	£10	
Radio Spares	238-671 Mains filter adaptor				Various other makes available	£23	
POWER BREAKERS							
BR. Electrical Products	Power Breaker H07 (13amp plug)					£18	
	Power Breaker (13amp adaptor)					£19	
UNINTERRUPTIBLE POWER SUPPLIES							
Make	Model					£. . .	
Power Equipment	Power Bank 200					£. . .	

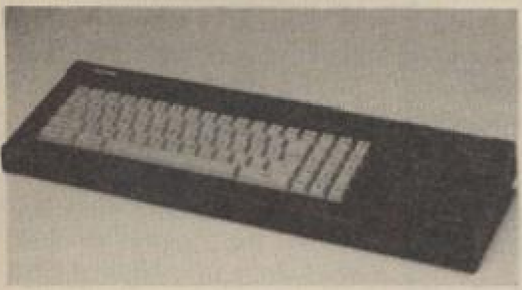
RME Powerpoint Ltd, Unit 16, Vernon Street, Mansfield, Notts. NG20 8ST Tel: 0623 748129
Power Equipment Ltd, Kingsbury Works, Kingsbury Road, London NW9 8UU Tel: 01-205-0033
Note 1: The Duraplug offering can now be bought complete with flex and plug for £9
Note 2: NuWay have released a 6-way version of "Masterplug".

FURNITURE TABLE

Make	Model	Approx width	Maximum depth	No. Shelves	Metal frame	Castors	Extras	Comment	Price
MFI	Alpine	33"	19"	2	Yes	No		Rack style	£15–£20
MFI	Signet	33"	19"	1	Yes	No	Drawer	Desk style	£17–£20
Lancelot	Computer Desk	38"	18"	2.5	No	No	Drawer	Bureau style	£35
Lancelot	Database Desk	40"	23"	2.5	No	Yes	Drawer	Desk style	£60
Lancelot	Printer Stand	24"	23"	3	No	Yes	Wire basket	Useful	£40
Qube	Work Station	25"	24"	3	Yes	Yes	—	Rack design	£40
Amsoft	Desk	34"	10"	4	No	No	—	Bureau style	£35
Shinecrest	Model 500	38"	23"	2	No	Yes	—	Desk style	£55
Shinecrest	Model 450	30"	19"	2.5	Yes	Yes	Masterplug	Desk style	£60
Shinecrest	Model 600	36"	24"	3	Yes	Yes	—	Rack style	£70
Opus	Organiser	40"	26"	3	No	Yes	—	Bureau style	£60
Opus	Model 7	25"	27"	1	Yes	Yes	—	Desk style	£103
Opus	Model 9	25"	24"	2	Yes	Yes	Wire Basket	Desk style	£161

All supplied as flat packs for self-assembly.
Except Amsoft and Opus, all are available in high-street stores.
Amsoft Desk: Victoria House, PO Box 10, Sunderland SR1 3RY. Price includes VAT & P & P
Opus Supplies Ltd., 55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey. Prices include VAT & P & P.

HOME MC
THE BES



Amstrad CPC6128 £279.99

When value is the criterion, the CPC6128 is difficult to beat. It features an internal disc drive with connections for a second and a Centronics printer and nine-pin joystick port.

Amstrad claims that more than 500 substantial programs are available for the machine and with the CP/M mode it allows additional software from the CP/M range to be used.

For: Good software base, good value.

Against: Basic can be tricky. Machine code poke needed to access full memory.



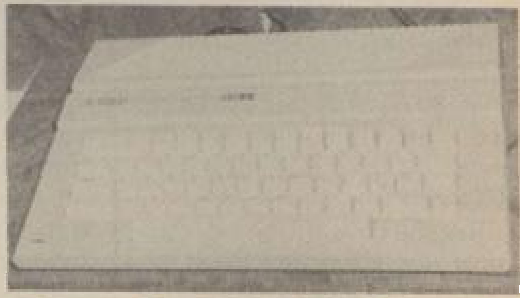
BBC Master 128 £499 inc VAT

Launched at the start of the year, the new Master series BBC micros provide extensive though costly access to the world of the 128K computer. Based on the well-proven design of the original 32K model, it features a 64K block of main RAM with four pages of 16K bytes making up the total.

Although the machine has a large software base, it is very expensive when compared to other machines offering similar facilities.

For: Large software base, Reliable design.

Against: Expensive when compared to other machines with similar facilities.



Atari 130XE £139.95

Atari appears to have produced the machine as an attempt to move away from the game-playing image it seems to have established in the U.K. The additional 64K which allows for word processing and other serious work requires a machine code poke to bring it into operation. That could limit the scope for those who want to use the additional memory in their programs.

Although the machine is well-supported by existing 800XL software, new software may be limited because of the Atari commitment to the 520ST.

For: Well-supported by existing software.

Against: Requires machine code poke to gain access to additional memory



Commodore 16K £49.99

An excellent beginners' machine with impressive graphics and good two-channel sound. Its only real brickbat is its small memory, which limits its software base and means that it cannot use much of the software available in the Commodore range.

Although memory expansion is possible, the absence of a standard nine-pin port means that you can use only the C16 joystick.

For: Impressive sound and graphics.

Against: No standard joystick port, small memory.



Commodore C128 £269.99

This machine features three distinct operating modes. The 64K mode allows software intended for the C64 to be used without modification. The extra memory is brought into play in the 128K mode but with Commodore supporting Amiga heavily, the amount of software available for that mode is likely to be limited.

Commodore claims that the third CP/M mode gives the machine access to a large range of business software, though in reality such software can be difficult to find.

For: Impressive design.

Against: Lack of CP/M and 128 mode software.



Sinclair QL £199

Based on a 16-bit processor and retailing for less than £200, the QL is good value but the inadequate Microdrive mass storage system could make the additional cost of a disc drive a necessity.

Limited availability of software may prevent the popularity of the machine rivalling that of the new 128K Spectrum.

For: Good value.

Against: Limited software base.

MICRO'S –
EST BYTE

If you are thinking of buying a new computer, it is important to know what's available. This guide will help you assess the current market.



Atari 520STM £399

The Atari ST range is the front-runner in the new trend in high-power micros. Based on the powerful 1040STF, the machine has less memory – still an impressive 512K RAM – and no built-in disc drive. A modulator socket allows it to be used with a TV set as well as a computer monitor.

For an additional £100, the 520STFM with its additional disc drive is available. Both machines feature a full windowing environment, mouse and sufficient expansion ports to bring them up to 1040STF specifications.

With the range starting at £399 for the 520STM, they represent excellent value.

For: **Excellent value.**

Against: **Small number of games available.**



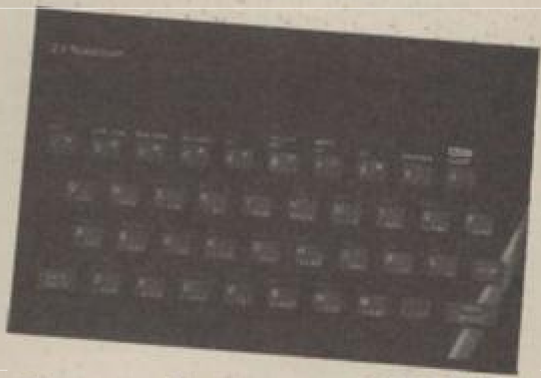
Commodore Plus 4 £200

Aimed at the gap between business and home micros and closely rivalling the QL and the BBC, the tremendous Plus 4 range of capabilities give it appeal to beginners and experts alike.

Four function keys give access to a built-in word processor, spreadsheet, database and a graphics package, while its machine code monitor, assembler and disassembler provide the serious programmer with an enormous reportoire of commands.

For: **Wide range of capabilities.**

Against: **Incompatible with other Commodore machines. Very difficult to obtain.**



Spectrum 48K/ Plus £120

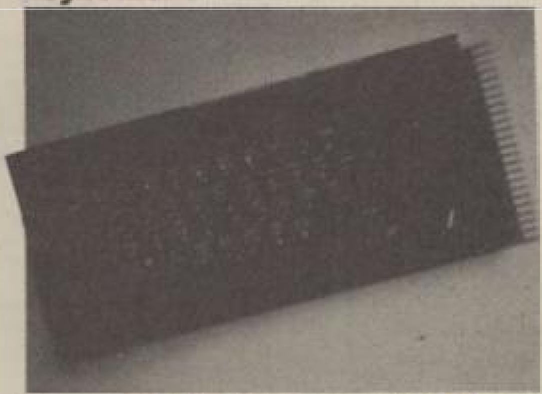
A best-seller since its release, the Spectrum is still one of the most popular micros on the market. The keyword function is good for those who cannot type and its software base is ever-expanding.

The Spectrum Plus with its QL-type keyboard has greater scope for expansion and retractable legs give a better typing angle.

Both are still good buys for those who want to start in computing.

For: **Largest software base Good beginners' keyboard.**

Against: **Those rubber keys.**



Spectrum 128K £155

This long-awaited machine did not include many of the features for which its potential buyers were hoping. Several improvements have been made and the sound quality has been greatly improved.

In 128K mode, the awkward keyword system is eliminated which, for those with some typing ability, can speed programming.

Compared to its main rivals, the 128 is an inexpensive yet practical way of entering home computing.

For: **Good quality sound.**

Against: **Lack of joystick port.**



Amstrad PCW8256 £399 + VAT

As a business machine the PCW8256 is an extremely good buy. The printer, when used with good paper, can go close to achieving the claimed near letter quality and in its draft mode it can reach speeds of 90cps. The high-quality printing takes place at a slower though not unbearable 20cps.

Some home computer enthusiasts may be disappointed at the lack of game-playing facilities, abscence of colour and limited sound but for the serious programmer the extensive memory offers a wide range of possibilities.

With a 512K version available for £499 plus VAT, still well below the price of the nearest rival, the PCW8256 seems set to take control of a section of the market other companies have yet to tackle.

For: **High-quality printing. Large RAM. Excellent value.**

Against: **Current lack of game-playing software.**

Enterprise 128 £249.95

Although it was one of the first and most advanced computers, sales of the Enterprise have never taken off. Because of that, only a limited software base is available.

Even when its impressive sound and graphics capabilities are taken into consideration, the machine is still expensive when compared to the CPC6128.

For: **Good sound and graphics.**

Against: **Small software base.**

THOUGHTS & CROSSES

(COMPUTERS) LTD.

33 MARKET STREET, HECKMONDWIKE, WEST YORKS

COMPUTERS

Amstrad CPC464 (green) + £100 FREE software	£199
Amstrad CPC464 (colour monitor) + £100 FREE software	£299
Amstrad CPC6128 (Col & disk drive)	£390
Amstrad CPC6128 (Green & disk drive)	£299
Amstrad PCW8256	£458
Amstrad PCW8512	£573
Atari 520ST	£658
Atari 520STM	£685
Atari 1040ST	£920
BBC B 32K	£310
BBC Master 128	£499
CBM 128 inc Free Software	£259
CBM 128D	£488
Sinclair QL	£149
ZX Spectrum+ & Free Software	£109
ZX Spectrum 128	£139

PRINTERS

* = Near Letter Quality

*Amstrad DMP-2000	£159
*Canon PW1080A	£285
*Canon PW1156A	£395
*Citizen 120D	£185
*Epson 6X80	£295
*Epson LX80	£235
*Juki 5510	£230
*Juki 5520 Colour	£425
Mannesman MT80+	£195
*Mannesman MT85	£335
Penman Plotter	£265
Samlecq DX85	£190
Shinwa CPA80	£179
Shinwa CPA80+	£189

DAISY WHEEL PRINTERS

Brother HR15	£375
Quen Data 1120	£189
Juki 6100	£320
Juki 6200	£549
Juki 2200 printer/typewriter	£259

PRINTER ACCESSORIES

Brother EP44 AC adaptor	£17
Brother M1009 Tractor unit	£27
Brother M1009 roller holder	£18
Brother HR5 AC adaptor	£17
Brother CF50 (HR15) Sheet Feeder	£220
Brother HR15 Keyboard	£150
Quen Data 1120 Tractor	£110
Epson LX80 Tractor unit	£22
Epson LX80 Sheet Feeder	£55
Juki 6100/6200 Tractor Feeder	£129
Juki 6100/6200 Sheet Feeder	£220

PRINTWHEELS

Qume Single Plastic	£6
Juki (TA) Single Plastic	£8
Juki (TA) Double Plastic	£14
Brother Double Plastic	£20

PRINTER INTERFACES
INTERNAL RS232 TYPE

Canon PW1080/1156A	£65
Citizen 120D RS232	£30
Epson without Buffer (Phone)	£32
Epson 2K Buffer (Phone)	£72
Juki 6100	£60
Mannesman MT80 with 2K Buffer	£45
Mannesman Tally MT80+	£36
Shinwa CP (A) 80 & 2K Buffer	£60

QL SOFTWARE

Cash Trader	Accounting Software	£62.95
Meteor Storm	Artalis	£11.65
QL Home Finance	Buzzz	£22.50
Steve Davis Snooker	CDS	£13.50
Bridge Player	CP	£16.95
Home Accounts Manager	Dialog	£17.95
Transact	Dialog	£31.50
Sprite Generator	Digital	£22.50
Super Backgammon	Digital	£14.40
Supercharge	Digital	£54.00
Superforth + Reversi	Digital	£27.50
Super Astrologer	Digital	£22.50
Super Arcadia	Digital	£14.40
Monitor/Disassembler	Digital	£17.95
Archiver	Eidersoft	£17.00
Archiver disk	Eidersoft	£22.50
Artice	Eidersoft	£11.65
BJ in 3D land	Eidersoft	£11.65
BJ the Return	Eidersoft	£9.80
Choice	Eidersoft	£13.50
Citadel	Eidersoft	£8.95
ICE	Eidersoft	£22.50
ICE Set	Eidersoft	£53.95
Impacct	Eidersoft	£180.00
Qdumps	Eidersoft	£8.95
Qspell	Eidersoft	£17.95
Aspell disk	Eidersoft	£22.50
Spook	Eidersoft	£9.80
Supercharge + Ice + Choice	Eidersoft	£80.95
Supercharge Compiler	Eidersoft	£49.50
Toolkit	Eidersoft	£8.95
Zappersagle	Eidersoft	£8.95
Hyperdrive	English	£13.50
Executive Adventure	Gemini	£11.65
Life & Business Organiser	Gemini	£17.95
QL Gardener	Gordian	£22.50
Assembler	GST	£35.95
Touch 'n' Go	Harcourt	£17.95
QL Mon	Hisoft	£17.95
QL Cavern	JMF	£11.65
Scrabble	Leisure Genius	£13.50
Assembler	Metacomco	£35.95
BCPL	Metacomco	£53.95
QL C	Metacomco	£89.95
Lisp	Metacomco	£53.95
Pascal	Metacomco	£80.95
Lands of Havoc	Microdeal	£17.95
QL Flight	Microdeal	£17.95
Chess	Psion	£17.95
Match Point	Psion	£13.50
Toolkit	Qjump	£22.50
Knight Flight	Realtime	£13.50
Integrated Accounts	Sagesoft	£79.95
QL Bounder	Sinclair	£8.95
Cartridge Doctor	Talent	£13.50
Cosmos	Talent	£13.50
Graphicol	Talent	£31.50
QL Paint	Talent	£22.50
West	Talent	£13.50
Zkul	Talent	£13.50
Tascopy	Tasman	£11.65
Tasprint	Tasman	£17.95
Decision Maker	Tryptych	£35.95R
Entrepreneur	Tryptych	£35.95
Project Planner	Tryptych	£35.95
QL Fictionary	Whoopee	£11.65

PCW 8256

Combo: Stock, Invoicing, Sales	Amsoft	£103.49
Nominal Ledger	Amsoft	£41.39
Purchase Ledger	Amsoft	£41.39
Brain Storm	Caxton	£45.00
Cardbox	Caxton	£90.00
Scratchpad Plus	Caxton	£62.95
Smart key	Caxton	£45.00
Touch 'n' Go	Caxton	£22.50
Accounts (Nom/Purch/Sales/Invs)	Compact	£179.95
Daybook	Compact	£45.00
Nominal Ledger	Compact	£62.95
Nucleus (2nd Drive Reqd.)	Compact	£89.95
Payroll (2nd Drive Reqd.)	Compact	£89.95
Purchase Ledger	Compact	£62.95
Sales & Invoicing	Compact	£62.95
Stock Control	Compact	£62.95
Clock Chess 3D	CP Software	£17.95
C Compiler	Digital	£45.00
DR Draw	Digital	£45.00
DR Graph	Digital	£45.00
Pascal MT/+	Digital	£45.00
Personal Assistant	FMP	£85.00
Devpac80	Hisoft	£35.95
Pascal80	Hisoft	£35.95
Pocket Wordstar	Micropro	
Accountant Plus	Sage	£135.00
Chit Chat	Sage	£63.00
Chit Chat Combo	Sage	£90.00
Database	Sage	£63.00
Invoicing	Sage	£63.00
Popular Accounts	Sage	£89.00
Popular Payroll	Sage	£89.00
Popular Accounts/Payroll	Sage	£135.00
Supercombo	Sage	£180.00
Supercalc 2	Sorcim	£45.00

EXTERNAL CENTRONICS TYPE

Kempston Interface-E Rom based for Spectrum	£39.95
Kempston Interface-S cass. for Spectrum	£29.95
Tasman cassette for Spectrum	£29.95
QL Centronics interface	£30
IEEE to Centronics for CBM 4032/8096	£70
Turbo Print GT Atari 800 etc.	£79
Isek CBM64 + 4	£60
Tripler 20/64 for CBM Vic20/64	£50
Ram CBM Centronics for 16/64/128/VIC 20 + 4	£29.95
Printerface centronics <-> RS232 converter & 2K buffer	£66
Electron First Byte Centronics	£19.95

PRINTER RIBBONS

Amstrad DMP 2000	£5.00
Amstrad PCW 8256	£5.50
Anadex 9500	£9
Brother EM1/EM2/HR1 SS	£2
Brother EM1/EM2/HR1 MS	£5
Brother EP44	£2.30
Brother HR5	£2.95
Brother M1009/DM5	£3.80
Brother HR15/25/35 SS	£4
Brother HR15/25/35 CO	£3
Brother HR15/25/35 MS	£6
Canon PW1080A/PW1156A/Kaga Taxan KP810/KP910	£5
CBM DPS1101 SS	£2
CBM DPS1101 MS	£5
CBM MPS 801	£6.50
CBM MPS 802	£6
CBM MPS 803	£3.80
CBM 1525	£4.50
CBM 4023 fabric	£6
Centronics Horizon H80/H156	£5
Epson GX/LX80	£4.50
Epson MX/FX/RX 80	£4
Epson MX/FX/RX100	£6
Juki 5510	£4
Juki 6100 Singlestrike	£2
Juki 6100 Multistrike	£5
Juki 2200 Correctable	£4
Juki 2200 Multistrike	£4
Mannesman Tally MT80+	£6
Mannesman Tally MT85	£6.50
Memotech DMX80	£9
NEC 8023	£7
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Seikosha GP80	£4.50
Seikosha GP100	£4.50
Seikosha GP550	£6.50
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10 or more ribbons deduct 10%
Others available, please ask

LEADS

Discovery to Centronics	£15
ACT Apricot/Sirius Centronics Printer	£15
Amstrad Centronics Printer	£10
Atari 520ST Printer	£15
BBC Centronics Printer	£10
BBC Microvitec RGB Monitor	£5.95
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Einstein Centronics Printer	£10
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MSX Centronics Printer	£15
Oric Centronics Printer	£10
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RS232 25 "D"	£20

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1000 Sheets of continuous tractor feed paper	£9
4000 Sheets of continuous tractor feed paper	£26
1000 Single or Double tractor feed labels	£6.50
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Commodore 1901	£289
Ferguson mono inc lead (please state which computer)	£82
Ferguson TX RGB	£230
Microvitec 1431 MS (Standard res.)	£215
Microvitec 1451 MS (Medium res.)	£290
Microvitec 1431 MZ	£245
Microvitec 1451 MZ	£275
Microvitec 1431 AP (Standard res. RGB/TTL)	£236
Microvitec 1451 AP MS4 (Medium res. RGB/TTL)	£345
Philips 7502 anti-glare green screen monitor (20MHz)	£82
Philips 7513 anti-glare green screen monitor (IBM)	£115
Philips 7522 anti-glare amber screen monitor (20MHz)	£95
Philips 7542 anti-glare white screen monitor (20MHz)	£95
Philips 8533 RGB/TTL/Audio Medium res. colour	£290

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Parrot, 3M, Control Data

S/S D/D 40T 10 for	£15
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S/S D/D 80T 10 for	£24

Parrot diskettes include FREE library case

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Epson LX/GX80	£4.80
Epson RX80F/T	£4.30
Epson FX80	£4.30
Juki 6100	£5.60
Mannesman Tally MT80(+)	£4.30
Memotech MTX 500/512	£3.99
Microvitec M-14"	£4.80
Philips 7502/7522 etc.	£4.30
Sage Elite Keyboard	£4.99
Sage Emperor Keyboard	£4.50
Seikosha GP80	£3.50
Seikosha GP100	£3.75
Shinwa CP80	£4.30
Shinwa GPA80(+)	£4.30
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ZX Spectrum	£1.99
ZX Spectrum Plus	£2.99

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5401 100K 40T	Opus	£99.00
5401D 100K 40T + PSU	Opus	£129.00
5802 400K 40T/80T DS	Opus	£135.00
5802D 2x 400K 40/80T DS + PSU	Opus	£329.00
5802P 400K 40T/80T DS + PSU	Opus	£145.00
CD800 2x 400K 40/80T DS + PSU	Cumana	£329.00
Challenger 3 720K Disk + 256K Ramdisk	Opus	£239.00
CS 100 100K 40T + PSU	Cumana	£129
CSX100 100K 40T	Cumana	£99.00
CS 400 400K 40/80T DS + PSU	Cumana	£159.00
CSX400 400K 40/80T DS	Cumana	£134.00

AMSTRAD PRODUCTS

Title	Company	
464/6128 AMS Mouse	AMS	£65.00
464/664/6128 Modulator MP-2	Amstrad	£29.00
464/6128 RS232 Interface	Amstrad	£46.00
PCW RS232/Centronics	Amstrad	£67.00
464 128K Upgrade	DK Tronics	£49.00
464 Speech Synthesiser	DK Tronics	£35.00
6128 256K ramdisk	DK Tronics	£95.00
6128 256K upgrade	DK Tronics	£95.00
464/6128 Doubler	Evesham	£14.50
464/6128 Siomo	NVP	£14.00
Nightingale	Page	£139.00
464 Modem 2000	Prism	£159.00
Amstrad DD-1 (Drive + Interface)	Amstrad 464	£159.00
Amstrad FD-1 (Second drive)	Amstrad 464	£99.00
Amstrad FD-1L	Amstrad 664/6128	£109.00
Cumana Second drive	Amstrad 664/6128	£95.00

JOYSTICKS & INTERFACES

Title	Company	
Acorn Electron		
Sure Shot Supreme Joystick/Interface/Utility Program		£18.00
Amstrad CPC464/664/6128		
Sure Shot Joystick	CCS	£15.00
Sure Shot Supreme	CCS	£17.95
Pro 5000 Joystick	Euromax	£16.95
BBC B/B+/A & Analogue		
Vulcan Joysticks (pair proportional joysticks the BBC)		£20
Sureshot	CCS	£16.95
CBM 64/VC20/128/Atari Range		
Sure Shot Joystick	CCS	£15.00
Sureshot Supreme	CCS	£17.95
Pro 5000 Joystick	Euromax	£16.95
Spectrum Interfaces		
KC	NVP	£9.00
Dual Port Interface	DK Tronics	£12.00
Pacesetter	NVP	£14.90
Spectrum Joysticks		
Pro 5000 Joystick	Euromax	£16.95
Sureshot Joystick	CCS	£15.00
Sureshot Supreme	CCS	£17.95

COMPUTER SOFTWARE

Title	Company
Spectrum	Commodore 64/128
Amstrad 464/664/6128/8256	Electron
BBC	Memotech
QL	Macintosh
Apple II (e)	IBM
Apricot	Atari ST

All our software is discounted by 10%
Please send for relevant software lists.

SPECTRUM

Title	Company	
Beta Basic 3.0	Betasoft	£13.50
Masterfile	Campbell	£13.50
Masterfile & MF Print	Campbell	£18.00
Astronomer III	CP Software	£8.95
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Supercode III	CP Software	£11.65
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C Compiler	Hisoft	£22.50
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Machine Code Tutor	New Generation	£13.50
Lightmagic	New Generation	£13.50
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Stock Manager Plus 80	OCP	£17.95
VAT Manager Standard	OCP	£8.05
VAT Manager Plus 80	OCP	£17.95
Editor & Assembler	Picturesque	£7.85
Spectrum Monitor	Picturesque	£6.75
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Trans Express (m/d)	Romantic	£9.95
Make A Chip	Sinclair	£5
Small Business Accounts	Sinclair	£8.50
VU 3D	Sinclair	£4.50
Tascopy	Tasman	£8.90
Tasmerge	Tasman	£9.80
Tasprint	Tasman	£8.90
Taswide	Tasman	£4.95
Tasword II	Tasman	£12.50
The Artist	Softek	£11.65
Blast (Compiler)	Oxford	£22.50

AMSTRAD 464/6128

Title	Company	
Basic Tutorial-1	Amsoft	£17.95
Decision Maker	Amsoft	£22.50
Pascal 80	Hisoft	£35.95
Dev Pac 80	Hisoft	£31.50
Project Planner	Amsoft	£22.50
Screen Designer	Amsoft	£13.50
Star Watcher	Amsoft	£17.95
Mastercalc CPC464	Campbell	£22.50
Masterfile CPC464	Campbell	£22.50
Artist & Sprite Designer	CRL	£8.05
Mini Office	Database	£5.35
Masterfile 664 (D)	Campbell	£27.00
Devpac	Hisoft	£22.50
Font 464	Hisoft	£7.15
Pascal	Hisoft	£22.50
Machine Code Tutor	New Generation	£13.50
Code Machine	Picturesque	£17.95
Tascopy 464	Tasman	£8.90
Tasprint 464	Tasman	£8.90
Tasword 464	Tasman	£17.95
Tasword 464 (disk)	Tasman	£22.50
Tasprint (disk)	Tasman	£11.80
Tascopy (disk)	Tasman	£11.80
Mastercalc (disk)	Campbell	£27.00
Cashbook	Gemini	£54.00
Cashbook (disk)	Gemini	£58.00
VATFile	Gemini	£18.00
VATFile	Gemini	£23.00
Final Accounts	Gemini	£54.00
Final Accounts (disk)	Gemini	£58.00
Database Management	Gemini	£18.00
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Over to You

Bugged Basic Blues

As a recent purchaser of the well-reviewed Atari 520ST, I was dismayed to find that the Basic has so many bugs in it that it cannot be used for any serious application.

After many hours trying to get programs to work, I approached Atari, which admitted that the file-handling routines are badly flawed and it has no idea when a revised Basic might be available so that the machine will function properly.

Having found that I cannot use the computer for what I wanted, I have had some entertainment experiencing its other novelties. LIST, EDIT, SAVE or REPLACE, called after running a program, very often cause the machine to crash. Another random happening is the rejection of FOR . . NEXT loops spread over two or more lines.

If anyone is interested in a computer which cannot access disc files but has many novel features which are undocumented, plus an impressive bouncing ball demonstration, make me an offer.

David Loverseed,
Stockport.

The Interface Connection

Please help. I am having problems with the Interface 1 on my 48K Spectrum. Although it is attached properly, the computer does not accept valid commands and prints the usual '?'.

I have tried cleaning the Spectrum edge with a pencil eraser and an alcohol-based cleaning fluid, as the man from Sinclair Research suggested, but neither has worked. I have had the problem previously but is has usually fixed itself. This time it has not.

Do I have a bad connection between interface and Spectrum or is my interface faulty?

Jonathan Farmer,
Edinburgh.

Editor's reply: Try testing your Interface with a Spectrum on which a different interface is known to operate. If it is still faulty, we suggest you take it back to where you bought it and ask for a replacement.

Calling All Einsteins

My computer belongs to that class of brilliant-for-the-price machines which never caught on due to inadequate marketing. Being CP/M 2.2-compatible and still commanding specific support, particularly in the vertical markets and games, the Tatung Einstein is far from being a lost cause.

Somewhere, though, there are a number of owners who may well believe that they are alone. For them, I would be grateful if you would publish the address of our user group. Membership is £6 annually. For that a member will receive a monthly newsletter of varying content covering reviews, advice, programs and letters. For an application form, please write to:

The Secretary,
UKEUG, Hillcroft,
Codmore Hill, Pulborough,
W. Sussex, RH20 1BQ.

New Worcester Source

I thought I would drop a line about Access, the new 24hr. bulletin board system which has opened in Worcester.

The services offered range from mail order goods and software files to hardware reviews and jokes. It supports the entire range of Spectrum and BBC computers, as well as the Electron, IBM PC, the Tandy and the Memotech. Many more are planned for the future.

NURD access is free. It then goes up in pounds until full access is reached for £5.

The modem number is 0905-52536.

Jonathan Brooks,
Sysop of Access,
Worcester.

Dear Bruce

An open letter from Bruce Everiss, printed in the February issue of *Your Computer* has prompted this reply:

Thank you for your interest in Micro Live and your suggestions. We have tried to develop a series that will be of interest to a wide audience, not only to the home user but also the business user and even the computer professional, to familiarise him with some of the newer developments in this fast moving industry.

We have interviewed many personalities in the industry including Sir Clive, Alan Sugar, Roger Foster and Shirley Williams, and we intend to do lots more. We think the computer industry news is boring too – that's why we have dropped it.

We are constantly experimenting with new ideas, changing the format and the emphasis of the programme and bringing in new personalities. We are very wary of being trapped into a ritualistic, predictable formula and welcome suggestions for change and improvements.

Yours sincerely,
Ian McNaught-Davis.

Write to: Your Letters, Your Computer, 79-80 Petty France, London, SW1H 9ED. Tel: 01-222 9090 Our Prestel mail box number is 01-9991 800.

Unfriendly Amstrads

I am tempted to believe that the reviewers of computers, never see or try them. The much-praised Amstrad range has the most obnoxious and unfriendly Basic ever devised, yet reviews always say what a super home computer it is. The Amstrad range is without doubt suitable only for more experienced computer users. Consider the following points:

Although based on the old Microsoft with extra commands, it is not as usable as the old TRS-80 of five years ago.

With an Amstrad you cannot use a command such as GOTO A. GOTO,GOSUB or RESTORE must be to a number. Try making a reasonable Basic program with this severe restriction. Enter a value of more than 32768 and the Amstrad may decide to treat it as a negative number.

Reviewers mention the compatibility between the three Amstrad machines. That is not true. The majority of the programs written for the CPC464 will not run on the 6128.

It appears to be the popular thing for magazines to laugh at the Spectrum with its 48K and rubber keys but I would recommend it with extra memory and a large keyboard as a better buy than any Amstrad machine. I suspect the real reason Alan Sugar bought Sinclair was his desire eventually to produce a real home computer with a genuine user-friendly Basic based on the Sinclair method and to scrap the antique Microsoft system.

G. A. Bobker,
ZX-Guaranteed,
Lancs.

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Spectrum

TAPE: SP03

CENTYPEED

Machine: Spectrum 48K
Program Type: Arcade
Author: Stuart King

Based on the original arcade game, *Centypeed* has all the features of the original, except a correctly-spelt name. Your snake's head at the bottom of the screen must survive in the mushroom patch. Nasties include the caterpiller, of course, and the bouncing spider. There are also the descending fleas, leaving a trail of mushrooms, and the occasional scorpion, creating poisonous mushrooms. The program is 100 percent machine code, giving a very fast-action, colourful game, with plenty of tough screens to keep you fighting well into the early hours.

FRANTIC DAY

Machine: Spectrum 48K
Program Type: Arcade
Author: John Weatherley

In this machine code levels-and-ladders game, you must take the role of Fred, and help him through is *Frantic Day*. Nine screens each have their own sprites, conveyors, scrolling platforms and such like, with which you will have to contend, but watch the lives and time remaining.

The program can be played with keyboard or Kempston joystick and features a cheat facility for you to try later screens.

TAPE: SP04

WINDOWS

Machine: Spectrum 48K
Program Type: Programming Utility
Author: Paul Rhodes

Windows is a utility for Spectrum 48K owners, allowing up to 14 separate windows – individual min-screens – showing simultaneously. They are accessed from Basic PRINT statements and an extended command set.

Features include pixel scroll and pan, window position and size – independent of attribute squares – double-height characters, extended LIST, attribute pan, scroll, clear-screen and fill commands, extended graphic areas for each window and fast filled and open circles.

Full instructions for the new commands and error messages are included.

EXBASIC

Machine: Spectrum 48K
Program Type: Programming Utility
Author: Dave Spagnol

ExBasic is an excellent Basic extension package for the 48K Spectrum. Features include procedures, Repeat . . Until loops, on-screen trace, clock, auto-line numbering, stack control, block delete, character re-definition, screen storage, an improved line editor and much more.

Full instructions are included to show how to use the package, including special directions for owners of Interface 1.

BBC

TAPE: BBC02

MAZELOC

Machine: BBC B
Program Type: Maze arcade
Author: Philipp Prince

It is the year 2022 and Superbanks have made robbery a thing of the past. Or have they? As Honest Joe, you have found a flaw in their security arrangements, allowing you to infiltrate the defences.

Inside the bank is a maze, controlled by Superdroids, and littered with gold coins. Can you collect them all, even with the help of your Anti Photon Field weapon? If so, you will be able to advance to the next even more dangerous level.

PSYCHO

Machine: BBC B
Program Type: Simulation
Author: Marcus Jeffery

Have you ever found your computer talkative? Probably only when it is giving your error messages. Well, with *Psycho*, all that could change.

Based upon the classic *Eliza* program, Psycho will attempt to give reasonable responses to anything you might type. Quick response times are achieved using fast hashed addressing into linked lists. The program is complete with the Doctor script and full details of how to write your own scripts into the data.

»Software Exchange«

CBM 64

TAPE: CBM03

TIDY-64

Machine: CBM-64
Program Type: Programming Utility
Author: Graham Blighe

One of the major problems with Commodore 64 Basic is that to make best use of it all the program statements have to be squashed together, making listings completely unreadable. *Tidy-64* will change that by allowing your to "prettyprint" listings from disc or tape to the screen or printer.

In addition to splitting multi-statement lines, inserting spaces between keywords, and indenting FOR . . NEXT and THEN statements, Tidy-64 caters for user-defined margins and titles, formatted line numbers and page numbering.

COM-GEM

Machine: CBM-64
Program Type: Programming Utility
Author: William Fong

This very handy utility will enable you to give your programs that professional look. Written entirely in interrupt-driven machine code, the program sets up sprite zero as an arrow and locks the top line of the display for use as a command line. Using the joystick – mouse-like – the user then moves the arrow to a particular choice and incidates that by pressing the button.

The utility will continue to work independently of any other tasks your computer may be running. The tape includes a simple demonstration program to show how the system works.

TAPE: CBM04

BUNKER

Machine: CBM-64
Program Type: Arcade
Author: Simon Beesley

The Gluks are invading the galaxy. Olf all the multitude of galaxies from which they had to choose, they have chosen yours. Guess who has to defend the *Bunker?*

Yes, you are commander of the Bunker and with the aid of two laser cannons and the Ryndbadster shield, you have to lay into the Gluk battle fleet.

With fast-action machine code, the enemy is fast but you have those meaty laser cannons of your own. An exceptional feature of the game is that one of the guns moves on a diagonal slope – controlled by up/down on the joystick.

RUNNER

Machine: CBM-64
Program Type: Arcade
Author: Ben Kirk

Are you fed up with the everyday life of eliminating hostile aliens which always seem to descend on you from a great height? Flying over a horizontally-scrolling landscape, you must battle seven waves of aliens; some shoot back, others may be indestructible. All the time keep an eye on the fuel gauge and the shields.

Amstrad

TAPE: AMS02

ODYSSEY

Machine: Amstrad CPC-464
Program Type: Maze Adventure
Author: Roger Collinson

Trapped in a maze within a maze. Surrounded by evil monsters, with hoards of diamonds. That is the setting for *Odyssey*, a most unusual adventure game.

Rather than using the long-winded text input, all commands in Odyssey may be input as a single letter, making for a quick-play game, though it will take you some time to get out of the mazes. Starting with 100 percent strength and agility and 12 very essential bullets, you have to try to escape. All the time you will be attacked by the maze monsters. Can you win through?

BEETLEMANIA

Machine: Amstrad CPC-464
Program Type: Arcade
Author: John Kennedy

The killer blobs are attacking your town, complete with their pet rubber ducks. They cannot be stopped but you may be able to hold them at bay byu blowing-up bombs in the four ponds, thus eliminating the rubber ducks.

This excellent game is written entirely in machine code and features a large, detailed four-way scrolling landscape, sound, user-defined controls and increasing difficulty levels.

By the way, you drive around in a trusty VW Beetle, hence the name.

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Polytechnic programs

Going to polytechnic can give you access to undreamed of programming power.

We struggled through the congested traffic of the Capital to bring you an exclusive report on the use of computers at the Polytechnic of North London. The Poly proved to be incomparable with the other schools we have visited because of the advanced nature of its computing; the main computer room resembles the nerve centre of a power station, controlling literally hundreds of terminals scattered across several square miles.

Created in 1971, North London Poly is an amalgamation of the Northern and North-Western Polytechnics. Funded by the Inner London Education Authority, the first computer was an Elliott 4120 which appeared in 1968, followed by a more powerful ICL computer in 1970. By today's standards, those machines were not just primitive but extremely unfriendly, leading to a dislike of computers by many who tried to use them.

Only the science departments had the strange mentality and patience to cope with their disadvantages, including the infamous punch cards.

Since then computers have become essential for many other subjects, including architecture, interior design and geography, as well as having extensive use by the business courses and the library, although there are no courses yet for computing alone.

A computer service department was established and now employs more than 30 staff for programming, technical operations and general maintenance of the system at all the Polytechnic sites. The present systems and programming manager was a student on the first Poly computing degree course in 1968.

At present the Poly, which has more than 8,500 students in full- and part-time courses, has a computer system dependent on only two mainframe computers. The first is a DEC-10, installed in 1978 and soon to be replaced. "We bought it with the intention of keeping it for just two years," commented the programming manager.

Standing some 5ft. from the ground and more than 6ft. long, it can control more than 120 terminals and store almost unlimited amounts of data on its three exchangeable 200MB disc drives – that is the equivalent of 60,000 100K discs.

Accompanying it is a slightly smaller but more advanced mainframe, the Vax 11/780, which the Poly installed in 1983. It has the facility for 64 ports and two 456MB fixed disc drives, a far cry from the 10MB drives sometimes used at the lower educational levels. The Vax is well-suited to the teaching of programming languages, mainly Pascal and Cobol, so its use is restricted to students whose courses involve a major part of computing."

Together the mainframes control more than 150 workstations, some of which are in groups at the main control centre but most of which are linked by dedicated BT lines to terminals in other department buildings up to a mile away. It is the main source of computing power for the departments involved, including the administrative departments, but most have now bought stand-alone PCs for special applications they have for computers.

To a certain extent that is for financial reasons; a simple terminal such as a BBC micro costs £200 but departments which require high-resolution graphics terminals and plotters may have to spend £50,000 to £100,000 on the necessary equipment.

There is some financial aid from large companies which sponsor students for research and development projects. One such project sponsored by ICI Plant Protection Division used the advanced graphics capabilities of some of the computers and the help of the chemistry department to aid the discovery of a new cereal fungicide called PP 450.

Previously fungicides had been sprayed on to partly-grown cereals, so having little effect on fungi beneath the leaves. PP 450 – flutriafol for short – is sprayed on to the planted seeds, so combatting the leaf fungi and other soil-borne diseases. The result should mean £500 million profit for ICI.

Another sponsor, from the north of England, is one of the few glass bottle manufacturers in the country. The present method of producing glass bottles involves cutting a melted globule which is pressed into the shape of a bottle. Unfortunately the age-old process wastes two to three percent of all the glass used, so some mathematics students are using computers to plot the formation of the glass globule and calculate when exactly to cut it, hoping to solve a world-wide problem.

Other projects include circuit board design, the graphical representation of geographical contours and a complete history of building developments in Islington, which was turned into a video by Islington council.

Plans are to continue developing the Poly computers, starting with a bigger mainframe capable of controlling at least 120 terminals at once, each running an advanced business or mathematical program. At present the Poly seems to be a little ahead of present technology with its requirements but with some departments producing their own computers, it may go some way to solving the needs.

Having looked at some of the training schemes and courses available, we turn our attention to one of the biggest users of computers and information technology in the country – the banks. They employ many thousands of staff in their computer centres who research new programs and monitor existing networks for faults.

Many career opportunities exist in the world of banking for those who want to work in computing. The type of position open to an applicant depends on qualifications and experience.

Until about 50 years ago, a major part of working in a bank would have involved many hours of entering details of customer transactions into big, heavy, dusty ledger books. Nowadays that has all changed because of the computer.

In the world of banking, computers have many applications in addition to storing the vast amounts of information about customer accounts. They control the hundreds of standing order payments made each day and the thousands of cash dispensing machines throughout the country.

About eight million cheques are exchanged between the major banks each day, with more than two million more being exchanged between branches of the same bank. During busy periods, like the beginning of the month or near to Christmas, those figures often double. The only way the banks can deal with that vast amount of paperwork is by using computer technology. The odd-shaped figures on the bottom of a cheque are printed

Banking on your computer

Once again we look at the careers available in the computing field. With services ranging from foreign exchange to cash dispensing, the banks use a great deal of computing technology.

in a special magnetic ink which permits them to be read by computer-controlled machines.

From those figures the computer can tell to whom the cheque belongs, where he banks and all his other personal details. The machines which print and read the figures have been standardised throughout the banking network to allow cheques from one bank to be processed by another.

Naturally all those operations require complex programs and people to monitor the systems to ensure that they are working properly and that is where you could be concerned. There are two main careers available to those who wish to work in banking:

Programmers, who write programs and run tests to ensure that programs run properly before being allowed into the network.

Operators, who look after and monitor the existing programs for faults. Because many bank computer operations, like cash dispensing machines, run on a 24-hour basis, operators are often required to work on shifts over a seven-day week.

Unlike many other professions, the banks do not restrict recruiting to those with diplomas and degrees. The careers structure has many levels and people with previous experience, A levels or O levels, are equally welcome.

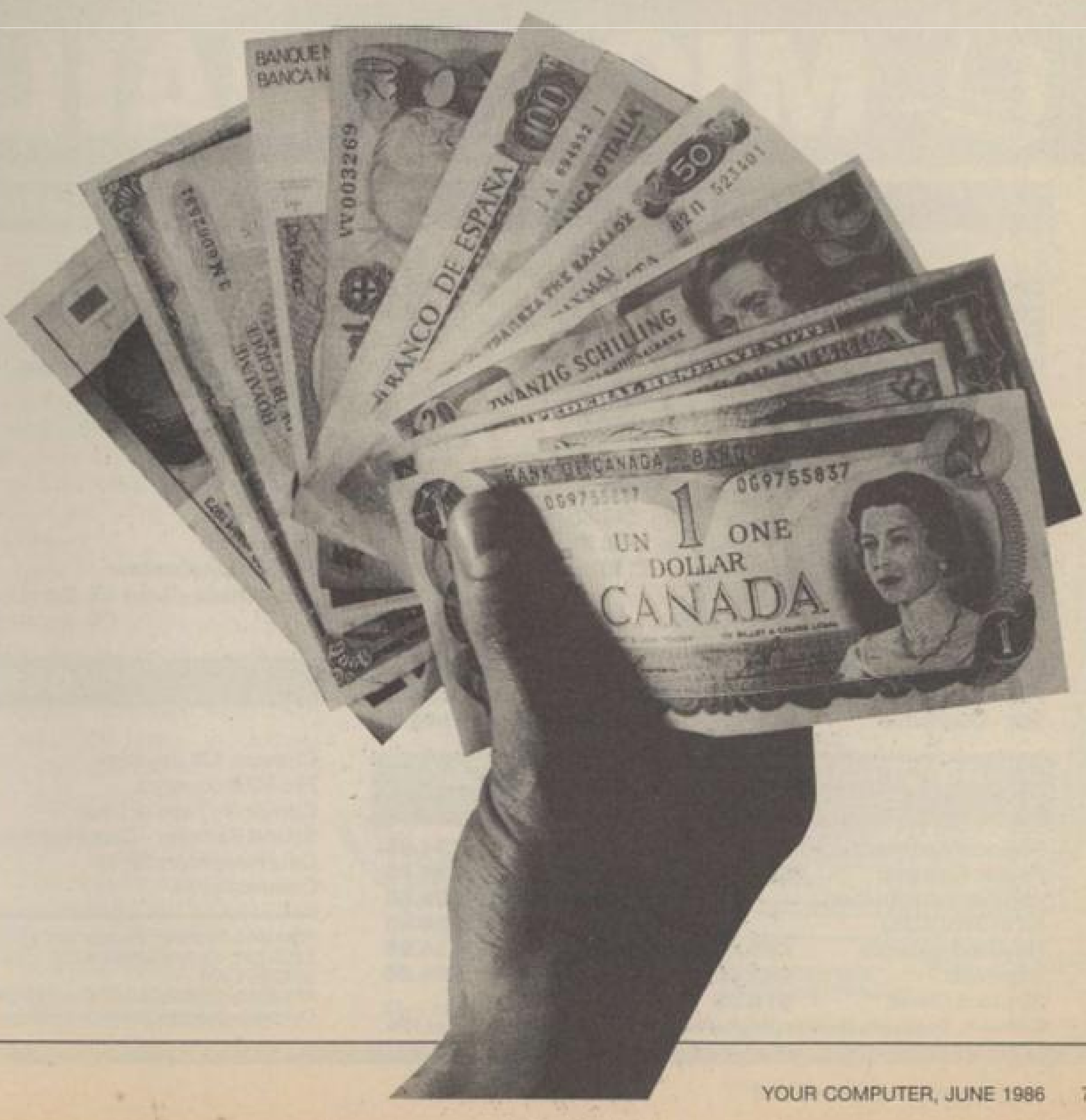
All prospective candidates are required to take an aptitude test, the results of which determine where on the careers ladder they begin. Those with high marks are trained on the programming and data processing side, those with slightly lower marks are trained as operators, while those who fail to reach a certain standard are rejected. Thus any previous experience, whether it be on home computers or with a computer firm, is an obvious advantage.

Prospects in both fields are generally very good; once fully-trained, programmers can progress to systems analysts, while hard-working operators can be promoted to shift-leader level. Salaries start at about £6,000 for trainee operators and are slightly higher for trainee programmers. Although figures for the more senior positions are not available, they are said to compare very favourably to other organisations. Enhanced rates of pay are given to those who work shifts.

Besides the security of working for a large and well-established organisation, there are many other advantages associated with working for banks, including cheaper mortgage rates, contributory pensions and staff profit-sharing schemes. All the banks also have many societies and sports clubs catering for all tastes.

For more information on computer careers in banking, contact the Banking Information Service at 10 Lombard Street, London EC3. Tel: 01-626 9386.

We wish to thank the Banking Information Service for help in producing this article.



We moved into Torvill and Dean territory to a computer club a short distance from Richmond Ice Rink. Based at East Twickenham Neighbourhood Association, there are no prizes for guessing it is called Richmond Computer Club. While it does not lay claim to so many stars as the Rink, several of its members, past and present, have been involved in the computer industry.

Richmond – a hot bed of talent

Do you remember the 7768? No, neither did I, but apparently it was featured in the second issue of *Personal Computer Weekly* in 1977, as the circuit diagram for a 68000 computer. It is one of the designers of the board, Bob Forster, who this month celebrates the birthday of the club which started in his home eight years ago. Membership expanded rapidly and shortage of space, chairs and coffee forced the club out of the living room and into the local community centre.

Variety of hardware

Computing at the club revolved round a Commodore Pet which Forster bought while working for Decca Navigator. Since then he has bought both a BBC micro and a Commodore 64. When asked which he prefers Bob gives a diplomatic answer:

"The BBC is best for logging on to Prestel but the Commodore has much better graphics," he says – carefully ensuring that he does not show overt favouritism for one over the other.

Forster is frank, however, about why Sinclair computers have never made an appearance at the club. "They are good to demonstrate what a computer can do but no good for teaching people, because of the odd keyboard," he says.

Although the club is a member of the Association of London Computer Clubs – it was one of the first six members – it has always been run on a fairly personal word-of-mouth basis, which may account for its continued support. While other clubs have suffered a decline – some had more than 100 members a few years ago but now have just a handful – Richmond has always had between 20 and 30 members, with up to 20 people attending each club meeting. By holding the meetings once a month, most people can attend regularly, while new members come and go.

Great enthusiasm

There is always great enthusiasm at the meetings. "Whenever a person comes with a question he always leaves with about six different answers," and Forster, who now works for Data General, is always willing to make repairs or modifications. Usually he takes a computer to meetings but relies on other members to take their own machines.

Lack of funds and local support led to the closure of the community centre some years ago, so the club moved to Richmond Adult College. There it remained until costs became too high – the college had a face-lift which increased the rent – and six months ago it moved back to the newly-formed community centre.

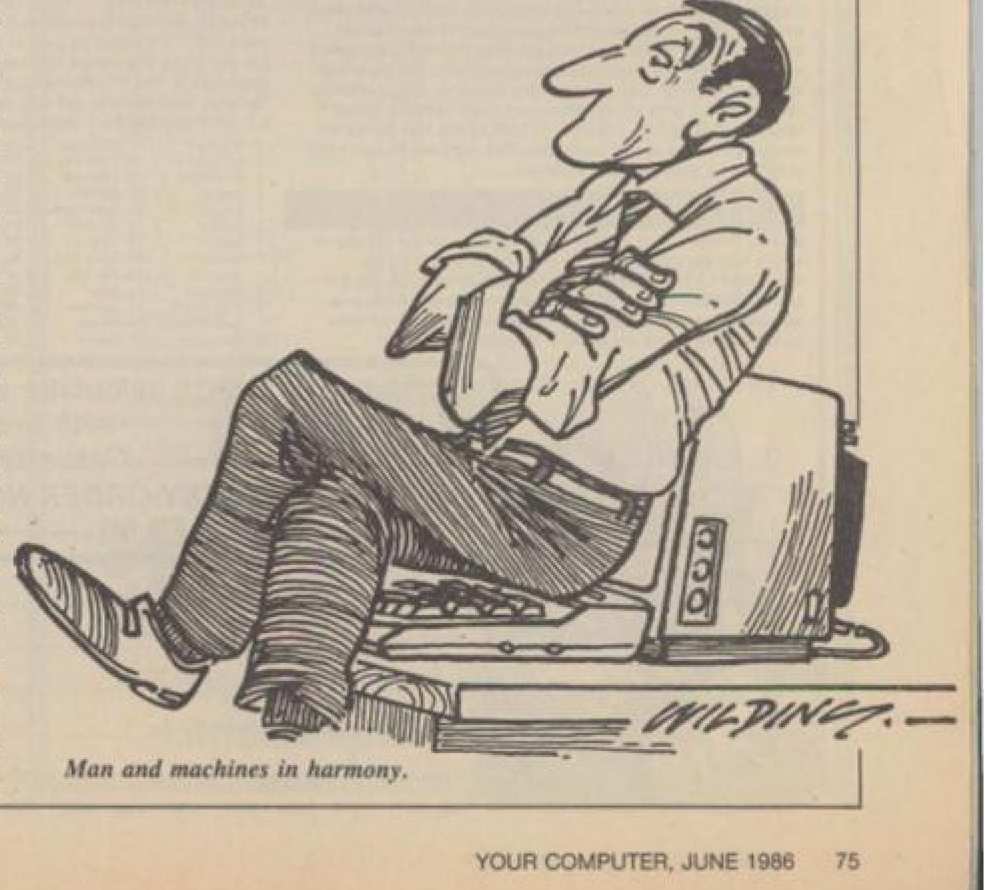
One regular member, who shall remain nameless, narrowly avoided prosecution for a disc-copying routine which he advertised in Beebug and the BBC decided was too powerful. When he is not developing programs on the BBC he works as a dentist, using a Commodore Pet to keep records of patients.

Some members, however, sell their work commercially. Mike Kurz, an 18-year-old from West Germany, recently joined the club after moving to the U.K. to attend school here. He now lives in Richmond, is an active member of the club, and recently completed work on the FM Sound Expander Module produced by Music Sales Ltd for the Commodore 64.

Despite the increasing use of computers in education and the home, as well as in industry, many computer clubs are having a difficult time. Richmond is an exception, perhaps because of its informal atmosphere – many members meet outside club hours – or because several members work with computers and have a continued interest in them. About a quarter of the members are regular programmers and Forster hopes that will continue. Other members exchange software – not commercially-written programs – or play games and music.

As for the future, Forster plans to stay with the Commodore and older BBC until better machines become as popular. So far as he is concerned, the Acorn new Master Series are not really new machines. "It is just a double-density disc interface, mounted on an Aries RAM board to control the screen," he says.

The club will continue to be represented at computer shows under the representation of the ALCC and Forster intends to continue giving lectures at other clubs in the area. To contact Forster call him in London on 01-892 1973 after 7 pm.



Man and machines in harmony.

MICRO MARKET


```
10 GOSUB1000:POKE3126,0:POKE3127,0:POKE46,1
2:POKE45,56
20 POKE56,16:POKE52,16:CLR:PRINT"(CLR)(SH
 D)O YOU WISH TO LOAD ANY TEXT";:INPUTA$
25 IFLEFT$(A$,1)<>"Y"THEN30
26 PRINT"(SH W)IND TAPE TO BEGINNING OF TEX
T":FORT=0TO2000:NEXT:SYS53210
27 A=PEEK(251)+256*PEEK(252):IFA>16384THENP
RINT"(SH S)OME OF YOUR TEXT WILL BE LOST."
28 GOTO80
30 S=4096:INPUT"(SH H)AVE YOU PREPARED ANY
TEXT (Y/N)";A$:IFA$="Y"THEN80
40 PRINT"(C=P)(LEFT)";
50 GETA$:A=ASC(A$+CHR$(0)):IF(A<32ANDA<>13)
ORA>218OR(A>95ANDA<193)THEN40
60 POKES,A:S=S+1:PRINT" (LEFT)"A$;:IFS<1638
4THEN40
70 PRINT:PRINT"(SH T)HAT'S ALL FOLKS !!!"
80 INPUT"(SH L)IST TO PLOTTER (Y/N)";A$:D=3
:IFLEFT$(A$,1)="P"THEND=6
82 INPUT"(SH S)EARCH UP TO HOW MANY CHARS(2
-6)";A:IFA<2ORA>6THEN82
85 INPUT"(SH D)O YOU WANT THE ORIGINAL TEXT
 (Y/N)";A$:Z=1:IFLEFT$(A$,1)="Y"THENZ=0
90 OPEN1,D:CMD1:IFZTHEN100
95 FORT=4096TO16383:X=PEEK(T):PRINTCHR$(X);
:IFX=0THENT=16384
96 NEXT
100 PRINT:PRINT" TEXT          ASCII CODES
  OCCURRENCE"
110 FORC=2TOA:POKE2,C-1:SYS53000:X=0:FORT=1
6384TOPEEK(251)+256*PEEK(252)-1STEPC+1
120 Z=PEEK(T+C)+1:IFZ<3THEN140
130 FORU=0TOC-1:PRINTCHR$(PEEK(T+U));:NEXT:
PRINT,:FORU=0TOC-1:PRINTPEEK(T+U),:NEXT
140 PRINTTAB(30)Z:X=X+Z:NEXT:PRINTX+C-1:NEX
T:PRINT#1:CLOSE1
1000 AD=53000:C=0:CO=0
1010 READA:CO=CO+A:IFA<0THEN1030
1020 POKEAD,A:AD=AD+1:C=C+1:IFC<8THEN1010
1030 READD:IFCO<>DTHENPRINT"CHECKSUM ERROR
IN"PEEK(63)+256*PEEK(64):END
1040 IFA>=0THENC=0:CO=0:GOTO1010
1050 RETURN
10000 DATA 32,47,207,76,170,207,32,72,843
10010 DATA 207,164,253,177,247,240,21,153,1
462
10020 DATA 167,2,136,16,246,32,81,207,887
10030 DATA 230,247,208,2,230,248,165,248,15
78
10040 DATA 201,64,144,226,76,163,207,169,12
50
10050 DATA 0,133,247,169,16,133,248,169,111
5
10060 DATA 0,133,251,169,64,133,252,164,116
6
10070 DATA 2,200,132,253,200,132,254,96,126
9
10080 DATA 160,64,132,250,160,0,132,249,114
7
10090 DATA 96,164,2,177,249,217,167,2,1074
10100 DATA 208,16,136,16,246,164,253,177,12
16
10110 DATA 249,201,255,176,4,105,1,145,1136
10120 DATA 249,96,165,249,24,101,254,133,12
71
10130 DATA 249,144,2,230,250,165,250,197,14
87
10140 DATA 252,144,214,165,249,197,251,144,
1616
10150 DATA 208,165,250,201,206,176,27,164,1
397
10160 DATA 2,185,167,2,145,249,136,16,902
10170 DATA 248,164,253,169,0,145,249,24,125
2
10180 DATA 165,251,101,254,133,251,144,2,13
01
10190 DATA 230,252,96,165,1,73,1,133,951
10200 DATA 1,96,32,194,207,32,163,207,932
10210 DATA 164,2,177,247,240,34,153,167,118
4
10220 DATA 2,136,16,246,32,129,207,76,844
10230 DATA 32,207,169,64,133,252,169,0,1026
10240 DATA 133,251,168,145,251,200,208,251,
1607
10250 DATA 230,252,164,252,192,206,144,242,
1682
10260 DATA 96,234,169,0,133,147,169,0,948
10270 DATA 133,195,169,16,133,196,32,44,918
10280 DATA 247,240,9,176,11,165,144,41,1033
10290 DATA 16,56,240,1,96,76,125,245,855
10300 DATA 76,4,247,19,-1,485
```

TEXT COMPRESSOR

◆ *Commodore* ● *P. K. Chan*

When text is stored in a computer, each character uses one byte of memory. That means that for larger programs, all the available memory could be used up quickly.

By compressing the text, certain words of letter sequences are replaced by a single character and the amount of memory used is greatly reduced. This program will search through up to 12K of text and print-out all the words or sequences of letters which appear more than twice.

The program allows the computer to store up to 5,000 sequences of letters before running out of memory but for most applications that limit is adequate. The program will print either to the screen or the 1520 printer-plotter. For other Commodore printers, change the value of D in line 80 to 4.

3-D ROTATOR

◆ *BBC* ● *Martin Latty*

This program allows the user to produce 3D shapes which can then be rotated through 90 degrees left or right of the starting point. The 3D effect is created by plotting one image and then plotting an identical image with a slightly greater Y value. Each corresponding point on the two shapes is then joined.

The front image is plotted in solid lines while the connecting lines and the rear image are dotted.

PROGRAM LISTINGS

SECURITY

◆ *Spectrum* ● *A. Thompson*

Type-in the program in listing one and save it. Next, load the program you wish to protect with 'Security', and type-in the following commands:

MERGE "Security"

to merge 'Security' in with the program you wish to protect. Then type:

GOTO 9900

You should get a listing of a line containing a number to be protected. The listing shows the text representation, or face value, which is not necessarily its real value. You will be shown the true value and be prompted for a new text representation. If you press ENTER the text representation will remain the same, or, or your input was of the same length as the text representation, it will be replaced by your input. If your input was not the length required, it will ask you again until it receives one of the correct length. When you have finished protecting your program, delete lines 9900 onwards.

This program changes the text representation of a number in a listing, without changing its value, so that when the program is listed, it appears to be correct, but if you were to edit a line and then insert it back into the program, it would not work. It is especially useful for loader programs, e.g., the following program could be changed from:

10 CLEAR 24999: LOAD ""CODE: LOAD ""CODE: RANDOMISE USR 25000

to:

10 CLEAR 12345: LOAD ""CODE: LOAD ""CODE: RANDOMISE USR 99999

and it would work perfectly, so long as the line was not edited and replaced in the program.

```
>LIST
 9900REM SECURITY
 9910REM BY A ANDREWS
 9920DEF FN l(e)=PEEK e*256+PEEK
(e+1): DEF FN p(e)=PEEK u+256*PE
EK (e+1): LET prog=FN p(23635) B
ORDER 0: PAPER 0: INK 6* BRIGHT
1
 9930LET line FN l(prog): LET le
ngth=FN p(prog+2): addr=prog+4:
LET end=addr+length-1: FOR i=add
r TO end: IF line=9900 THEN CLS
: PRINT "O.K. all lines protecte
d.": STOP
 9940IF PEEK i<>14 THEN NEXT i:
LET prog=i: GO TO 9930
 9950CLS : PRINT line;" : ";: FO
R j=addr TO end: LET j=j+(6 AND
PEEK j=14) : PRINT CHR$ PEEK j;:
 NEXT j
 9960FOR j=i TO end: IF PEEK j<>
14 THEN NEXT j: LET prog=end+1:
GO TO 9930
 9965 FOR x=i-1 TO prog STEP -1:
 IF PEEK x>47 AND PEEK x<58 THEN
 NEXT x
 9970 LET l=j-x-1: PRINT '"Lengt
h of input required ---."; PAPER
 1; INK 7;l: PRINT '"Face value
--->";: FOR x=x+1 TO j-1: PRINT
PAPER 1; INK 7;CHR$ PEEK x;: NEX
T x: PRINT ''"True value ---->";
 PAPER 1; INK 7;FN p(j+3)
 9980INPUT "New face value ---->
";a$: IF a$<>"" AND LEN a$<>l TH
EN GO TO 9980
 9990IF a$<>"" THEN FOR z=i-l TO
 i-1: POKE z,CODE a$(z-(i-l-1)):
 NEXT z
 9995 LET i=i+6: GO TO 9940
```

```
>
>LIST
   10REM******************
   20REM***            ***
   30REM*** 3D-Rotator ***
   40REM***     by     ***
   50REM***Martyn Latty***
   60REM***            ***
   70REM******************
   80MODE 4
   90VDU23,1;0;0;0;0;
  100*KEY 10 OLD|MRUN|M
  110ON ERROR GOTO 180
  120PROCinst
  130CLS:PROCinit
  140REPEAT
  150PROCdraw(1)
  160PROCchoice
  170UNTIL FALSE
  180MODE 6
  190PRINT''"Hope you liked the program."
  200END
  210:
  220DEFPROCinit
  230DIM X(50),Y(50),IX(50),IY(50),D(50),ID(50)
,DY(50),IDY(50),DYR(50),IDYR(50), IDR(50)
  240RESTORE1300
  250E=200
  260N=0:REPEAT
  270READ A,B:IF A=-1 OR B=-1 THEN 300
  280IF A>1280 OR B+E>700 THEN PROCerror:END
  290N=N+1:X(N)=A:Y(N)=B:IX(N)=A:IY(N)=B+E
  300UNTIL A=-1 OR B=-1
  310VDU28,6,6,30,2
```



```
320PROCdiff
330ENDPROC
340DEFPROCLrotate
350 IF IX(Lnum)<Larg THEN420
360IF Y(1)>=YStart+E THEN PROCNomore:GOTO 460
370F=0:REPEAT F=F+1
380X(F)=X(F)+D(F):IX(F)=IX(F)+ID(F)
390Y(F)=Y(F)+DY(F):IY(F)=IY(F)+IDY(F)
400UNTIL F=N
410GOTO460
420F=0:REPEAT F=F+1
430X(F)=X(F)-D(F):IX(F)=IX(F)-IDR(F)
440Y(F)=Y(F)+DYR(F):IY(F)=IY(F)+IDYR(F)
450UNTIL F=N
460ENDPROC
470DEFPROCRrotate
480IF IX(SNum)>Small THEN 490 ELSE 540
490F=0:REPEAT F=F+1
500X(F)=X(F)-D(F):IX(F)=IX(F)-ID(F)
510Y(F)=Y(F)-DY(F):IY(F)=IY(F)-IDY(F)
520UNTIL F=N
530GOTO590
540 IF Y(N)>=YStart+E THEN PROCNomore:GOTO 590
550F=0:REPEAT F=F+1
560X(F)=X(F)+D(F):IX(F)=IX(F)+IDR(F)
570Y(F)=Y(F)-DYR(F):IY(F)=IY(F)-IDYR(F)
580UNTIL F=N
590ENDPROC
600:
610DEFPROCdraw(C)
620GCOL0,C:F=0
630REPEATF=F+1
640IF F=N THEN OP=1 ELSE OP=(F+1)
650MOVE IX(F),IY(F):PLOT21,IX(OP),IY(OP)
660UNTIL F=N
670MOVEIX(N),IY(N):PLOT21,IX(1),IY(1)
680F=0:REPEAT F=F+1
690MOVEX(F),Y(F):PLOT21,IX(F),IY(F)
700UNTIL F=N
710F=0:REPEAT F=F+1
720IF F=N THEN OP=1 ELSE OP=(F+1)
730MOVEX(F),Y(F):DRAWX(OP),Y(OP)
740UNTIL F=N
750ENDPROC
760:
770DEFPROCinst
780CLS
790PRINTTAB(14,1)"3D - ROTATOR"
800PRINTTAB(14,2)"************"
810PRINTTAB(0,4)"This program will show your shape in 3D by having
the view po int above the       ground."
820PRINT''"The program will draw up your shape thendraw the image
behind it and join up     the points."
830PRINT''"You may then rotate the shape through   90 degrees LEFT
or RIGHT of the STARTINGpoint."
840PRINT'"Press 'R' to rotate RIGHT"'TAB(6);"'L' to rotate LEFT"
850PRINT'"Press ESCAPE to end."
860PRINT''TAB(8)"Press <<SPACE>> to START"
870REPEAT UNTIL GET=32
880ENDPROC
890:
900DEFPROCerror
910CLS:PRINT''"You're coordinate values are too big."'"They must be
between 0  and 1280 on the  x-axis and 0 and 500 on the y-axis."
920ENDPROC
930:
940DEFPROCchoice
950CLS:PRINT"Rotate 'L'eft or 'R'ight"
960INPUT An$
970IF An$<>"L" AND An$<>"R" THEN 950
980IF An$="L" THEN PRINT''''TAB(2)"ROTATING LEFT" ELSE PRINT''''
TAB(2)"ROTATING RIGHT"
990PROCdraw(0)
1000IF An$="L" THEN PROCLrotate ELSE PROCRrotate
1010ENDPROC
1020:
1030DEFPROCdiff
1040Larg=0:Small=2000
1050YStart=2000
1060FOR F=1 TO N
1070IF X(F)<Small THEN Small=X(F):SNum=F
1080IF X(F)>Larg THEN Larg=X(F):Lnum=F
```

```
1090IF Y(F)<YStart THEN YStart=Y(F)
1100NEXT F
1110Div=(Larg-Small)/20
1120FOR F=1 TO N
1130D(F)=X(F)-Small:D(F)=10-(D(F)/Div)
1140ID(F)=Larg-X(F):ID(F)=ID(F)/Div
1150DY(F)=(ID(F)/20)*(E/Div)
1160IDY(F)=Small-X(F):IDY(F)=((IDY(F)/Div)/20)*(E/Div)
1170DYR(F)=((D(F)-10)/20)*(E/Div)
1180IDR(F)=ID(F)-20
1190IDYR(F)=(ID(F)/20)*(E/Div)
1200NEXT F
1210ENDPROC
1220:
1230DEFPROCNomore
1240SOUND1,-15,130,20
1250PRINT'''"YOU CAN ROTATE NO FURTHER THIS WAY"
1260PRINT"PRESS <<SPACE>>"
1270REPEAT UNTIL GET=32
1280ENDPROC
1290DATA200,200,200,500,300,500,300,400,800,400,800,500,900,500,900,
200,-1,-1 1300DATA200,140,220,160,200,180,200,200,350,230,500,240,620,
320,800,320,1020,24 0,1020,180,930,160,870,210,810,150,460,140,420,180,
370,140,-1,-1
```


EGG HEAD

◆ *Commodore 64* ● *Andrew Isaacs*

This game involves guiding *Egg Head* over a wall while trying to avoid colliding with various obstacles which cross your path. The only way to do it is to catch hold of an aircraft which flies overhead constantly. That will carry you along for a short time before dropping you in a place of safety. Control is maintained by the use of a joystick connected to port one.



```
10 REM EGG-HEAD:Y0:SC0
20 V53248
30 POKEV
21,31
40 POKE2040,192:POKE2041,193:POKE2042,194
50 POKE2043,195
60 FORN12288TO1230:READQ:POKEN,Q:NEXT
0 FORM1232TO12414:READW:POKEM,W:NEXT
80 FORZ12416TO1248:READE:POKEZ,E:NEXT
90 FORX12480TO12542:READR:POKEX,R:NEXT
100 DATA0,28,0,0,34,0,0,65,0
110 DATA0,3,0,0,9,128,0,65,0
120 DATA0,65,0,0,62,0,0,62,0
10 DATA0,12,0,0,12,0,0,14,0
140 DATA0,15,0,0,0,0,0,0,0
10 D@TA0,0,0,0,0,0,0,0,0
160 DATA0,0,0,0,0,0,0,0,0
10 DATA0,120,0,0,132,0,1,2,0,2,1,0
180 DATA3,3,0,2,13,0,2,121,0,1,0,0
190 DATA0,132,0,0,120,0,0,0,0,0,0,0
200 DATA0,0,0,0,0,0,0,0,0,0,0,0
210 DATA0,0,0,0,0,0,0,0,0,0,0,0
220 DATA0,0,0
230 DATA0,0,0,0,0,0,0,0,0,32,0,0
240 DATA48,6,0,56,15,0,60,25,128,63,255,192
250 DATA63,255,224,63,255,240,63,255,248,0,
142,0
260 DATA1,126,0,3,194,0,7,2,0,6,2,0
270 DATA0,2,0,0,2,0,0,2,0,0,5,0
280 DATA63,255,128
290 DATA0,248,0,1,252,0,3,254,0,7,255,0
300 DATA7,255,0,4,1,0,2,2,0,2,34,0
310 DATA1,84,0,1,84,0,4,249,0,2,218,0
320 DATA1,220,0,0,80,0,0,112,0,0,80,0
330 DATA0,80,0,0,216,0,0,0,0,0,0,0
340 DATA0,0,0
350 PRINT"(CLR)":S=0
360 PRINT"(WHT)..          ...
 ."
370 PRINT"   .   .            ..  ."
380 PRINT"       .      .       .
  .."
390 FORT=0TO8:PRINT" ":NEXTT
400 PRINT"                              (C
=K)"
410 PRINT"(RVS)[RED)[C=R)[SH C)[C=R)[SH C)[
C=R)[SH C)[C=R)[SH C)(C=R)[SH C)[C=R)[SH C)
(C=R)[SH C)[C=R][SH C)[C=R)[SH C)[C=R)[SH C
)[C=R)[SH C)[C=R)[SH C)[C=R][SH C][C=R)(SH
C)[C=R)[SH C)[C=R)[SH C)[C=R][SH C)[C=R][SH
 C)[C=R)[SH C)[C=E)"
420 FORT=0TO4
430 PRINT"(RVS)[RED)[C=E)[C=R][C=E)[C=R][C=
E)[C=R)[C=E)[C=R][C=E)[C=R)[C=E)[C=R)[C=E)[
```

```
C=R)[C=E)(C=R][C=E)[C=R)[C=E][C=R)[C=E][C=R
][C=E][C=R][C=E)[C=R][C=E)[CR)[C=E)[C=R][C
=E)[C=R)[C=E)[C=R)[C=E][C=R)[C=E)(C=R)[C=E)
"
440 PRINT"(RVS)[RED)[C=R)[C=E][C=R][C=E][C=
R)[C=E)[C=R][C=E)[C=R][C=E)[C=R)[C=E][C=R][
C=E][C=R][C=E][C=R][C=E][C=R)[C=E][C=R][C=E
][C=R)[C=E][C=R][C=E][C=R][CE)[C=R][C=E][C
=R)[C=E)[C=R)[C=E](C=R][C=E)[C=R][C=E)(C=R]
"
450 NEXT
460 POKE53280,0:POKE53281,4
470 POKEV+4,10:POKEV+5,100:POKEV+2,0:POKEV+
3,0
480 POKEV+39,2
490 Q=15:W=141
500 POKEV+0,Q:POKEV+1,W:POKEV+6,0:POKEV+7,0
510 POKEV+40,6:POKEV+41,7:POKEV+42,11
520 FORT=0TO100:NEXT
530 POKE54296,15
540 POKE5427,190
550 POKE54278,248
560 POKE5423,1:POKE54272,3
50 POKE5426,17
580 FORT=0TO200:NEXT
590 POKE54273,17:POKE54272,37
600 T=10
610 O10
620 P=INT(150*RND(1))+15
630 B=250
640 T=T+6:POKEV+4,T:POKEV+5,100
650 IFT>245THENT=10
660 POKE5423,0:POKE5422,0
60 O=O+5:POKEV+6,P:POKEV+7,O
680 IFO=140 THEN P=INT(180*RND(1))+15:O=10
690 BB-3:POKEV+2,B:POKEV+3,143
00 IFB<12THENB=250
10 IF Q+9<B+1AND Q+16B+6 THEN 1010
20 IF O130THEN IF Q+8<P+16AND Q+16P+5 TH
EN1010
30 A255-PEEK(321)
40 IFA AND 8 THEN 80
50 IFA AND 16 THEN 840
60 POHE5426,33:POKE5427,19POKE5422,6
0 GOTO 640
80 QQ+3
90 POKEV+1,143:POKEV+0,Q:POKEV+1,141
800 W141
810 IFQ24 THEN1180
820 GOSUB110
80 GOTO 0
840 POKE42,0POKE422,0
850 FORW141 TO 120 STEP-1:POKEV+1,W:NEXT
860 IF Q
9T-1 AND Q+T+1 THEN 80
80 FORW120 TO 141:POKEV+1,W:NEXT
880 GOTO 0
890 FORL0TO29
900 QQ+1
910 POKEV
0,Q
920 TT+1
930 POKEV+4,T
940 IFQ245 THEN 1180
950 NEXTL
960 FORW120 TO 141:POKEV+1,W:NEXT
90 GOTO 70
980 TT+1
90 FORW120 TO 141:POKEV+1,WNEXT
1000 GOTO 0
1010 YY
1
1020 POKE54296,15:POKE542,25:POKE5428,24
6
1030 POKE5423,12:POKE5422,12
1040 POKE5426,129
1050 FORA=0TO 200:NEXTA
1060 POKE5426,0:POKE542,0:POKE5428,0
100 IF Y THEN 1090
1080 IF Y<3THEN 460
1090 PRINT"[WHT]PRESS A TO START"
1100 Y0
1110 GETA$:IF A$"A" THEN 350
1120 GOTO 1110
1130 POKE54296,15:POKE5426,129:POKE542,1
5
1140 POKE5423,40:POKE54272,200
1150 FORL0TO 2:NEXT
1160 POKE5426,0:POKE542,0
110 RETURN
1180 POKEV+0,0:POKEV+1,0:POKEV+2,0:POKEV+3,
0
1190 POKEV+4,0:POKEV+5,0:POKEV+6,0:POKEV+,
0
1200 SS+10
1210 POKE5423,0:POKE5422,0
1220 PRINT"[UP]YOUR SCORE IS "1230 FORT141 TO 100 STEP-1
1240 POKEV+1,T
1250 NEXTT
1260 FOR TQ TO 1 STEP-1
120 POKEV,T
1280 NEXT
1290 FORT100 TO 141
1300 POKEV+1,T
1310 NEXT
1320 Q15:W141
1330 GOTO 640

READY.
```

3D COLOUR ANIMATION

◆ *Amstrad* ● *P. Bowers*

This program produces three dimensional star patterns. The 3D effect is created by using several banks of different sized pixels which scroll up and down. Each bank moves at a different speed to enhance the effect.

```
10 '**** 3D COLOUR ANIMATION! ****
20 '**** BY PETER BOWERS 1986 ****
50 '
60 '
70 ON BREAK GOSUB 310
80 MODE 0 :INK 0.0:INK 14,24:INK 15,6:BORDE
R 7
90 REM *** PLOT STARS ***
100 FOR a=16 TO 624 STEP 30
110 R=RND(1)*50:R1=RND(1)*50:R2=RND(1)*50
120 FOR B=0 TO 480 STEP 2
130 PLOT a,b-R,b/4 MOD 13+1
140 PLOT a+10,b-20-R1,b/3 MOD 13+1
150 PLOT a+20,b-40-R2,b/2 MOD 13+1
160 NEXT B,A
170 GOSUB 320
180 REM *** PRINT INFRONT OF STARS ***
190 FOR P=1 TO 4 STEP 2
200 LOCATE 3,10+P:PEN 15 :PAPER 14:PRINT"SC
ROLLING STARS*"
210 NEXT P
220 REM *** SCROLL UP ***
230 FOR S=0  TO 40
240 FOR a=1 TO 13:INK a,26:CALL &BD19:INK a
,0:NEXT
250 NEXT
260 REM *** SCROLL DOWN
270 FOR S=0  TO 40
280 FOR a=13 TO 1 STEP -1:INK a,26:CALL &BD
19:INK a,0:NEXT
290 NEXT
300 GOTO 230
310 CALL &BC02:MODE 2:PAPER 0:LIST
320 FOR A=0 TO 16:PLOT 0,A,14:DRAWR 640,0,1
4:NEXT
330 FOR A=18 TO 384:PLOT 0,A,15:DRAWR 16,0,
15
335 PLOT 640,A,15:DRAWR -16,0,15:NEXT
340 FOR A=386 TO 400:PLOT 0,A,14:DRAWR 640,
0,14:NEXT
350 RETURN
```

WIN A FLIGHT IN A PIT SPECIAL

PLUS 25 RUNNERS-UP PRIZES OF THE GAME STRIKE FORCE HARRIER

PRESENTED IN CONJUNCTION WITH MICROSOFT

All entrants will receive a free Strike Force Harrier poster



The three first prizewinners in this exciting competition will have the chance to fly in the famous Pit Special aircraft. The winner will be treated to a flight which will leave the ground at 70mph then climb to 2,000 feet at a rate of 1,700 feet/min. While in the air, the Pit Special will perform a number of aerobatic exercises, including a barrel roll and a 20-second period of inverted flight.

This is a chance of a lifetime – flying in a real aircraft, exposed to the elements – none of the air-conditioned comfort of a commercial flight.

QUESTIONS

1. ***One of the Harrier's greatest assets in air combat is its VIFFing ability. What does VIFF stand for?***
2. ***There are three major types of ground attack Harrier in use. Which type is used by:***
   a) The RAF b) The Fleet Air Arm c) The US Marines.
3. ***What code name was given to the Falklands campaign?***
4. ***In which year did the Harrier first enter active service with the RAF?***

TIE BREAK

Write a short – 100 word – description of your ideal flight simulator game and design a striking front cover for it.

COMPETITION RULES

- The three first prizes and 25 runners-up prizes will be awarded to the people who send an all-correct entry with, in the opinion of the judges, the most appropriate tie break sentence before the closing date of the competition.
- The names of the winners will be announced in the August issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day of June, 1986.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Focus Investments nor their agents or close relatives may enter the competition.
- The decision of the Editor in all respects of the competition will be final.
- No correspondence with regard to any aspect of the competition will be entered into.
- Focus Investments assumes no responsibility or liability for any complaints arising from this competition.

STRIKE FORCE HARRIER COMPETITION

Do not forget to enclose this coupon, or a photocopy of it, when you send your entry, marked Strike Force Harrier Competition, to the *Your Computer* editorial offices at 79-80 Petty France, London, SW1H 9ED

Answers: **1** ____ **2a** ____ **2b** ____ **2c** ____ **3** ____ **4** ____

Name ______________________________

Address ______________________________

____

Please state which version of the game – BBC, Commodore 64, Sinclair or Amstrad – you will require should you win one of the runners-up prizes.

PSS

Generals, wizards a

PSS has been carving itself a niche with the Wargames and D&D brigade. We preview the program for 1986 which seems certain to confirm its supremacy.

CND and *The Sun* are strange bedfellows but in its time, PSS, the wargame specialist from Coventry, has managed to rouse the ire of both those irascible institutions. Despite that, Gary Mays, who formed the company with Richard Cockayne in 1981, is unrepentant.

"I stand by both *Theatre Europe*, which deals with a border incident escalating into Armageddon, and *Falklands '82*, which concerns the South Atlantic conflict," he says.

"CND accused us of bad taste with Theatre Europe but did not look at the product. It is a simulation. We fed in the figures and the scenario, which we think is plausible, and the horrifying results speak for themselves. We obtained our figures from NATO, the Soviet Embassy and the Jane's books on military forces. We also allowed you to play either side, and before you could order a strike, you had to ring our answerphone for the code word which had a message explaining the real-life consequences of such a decision.

"In the game, losing the conventional war is not so bad as starting a holocaust. We received plenty of criticism but we also had plenty of awards for a strategy game which created atmosphere. In Falklands '82, we were attacked for having a game where the Argies could win – but it could have happened. It is papers like *The Sun* which trivialised the war, not us. Neither did we have the arcade sequences which have featured in our other games. What is so great about *Rambo*, *Commando* and *Raid Over Moscow?* The atmosphere they generate is far worse."

So much for history. What fresh troops has PSS in the barracks? Not only is there more of the same on the way from the wargame team headed by Alan Steel. Mike Simpson is planning to follow the success, *Swords and Sorcery*, with more releases using his revolutionary Midas system. There are also more games on the way from Informatique, the PSS French connection.

Conversions of *Iwo Jima* are planned and Theatre Europe is about to explode on to Spectrum screens. That is more than just a conversion. PSS has taken the opportunity to improve the arcade sequences which have always been a rather suspect part of its wargames. According to Steel, it is always a question of balancing resources, both time and memory space, spent on the wargame and arcade sides of the game. The arcade section is there to make the game more accessible to mainstream games players. The purists can ignore it but if you are really hot in the arcade section, it can turn the outcome of the whole game completely.

In the new version, you have icon selection of Migs, missiles and air-strikes. That strengthening of the arcade element is taken up again by the next two games, *Tobruk* and *Bismarck*. Tobruk covers the battle of Gazela in 1942, around the vital British fortress. Among its many exceptional features, the Amstrad version will allow the two players completely hidden movement – two Amstrads are connected via the joystick ports. A wiring diagram is supplied, or you can buy a cable from PSS. Supply is all-important in the game, as it was in the battle. There is also a great deal of detail when it is a matter of using your air force and engineers. Aircraft can intercept, interdict supply, or attack ground units. Engineers can repair tanks, go on sabotage missions, or lift mines.

The arcade screens allow you to drive a tank, using machine guns or cannon as appropriate. On the strategic map, it will use the "action box" system of *Midway* but movement will be sequential rather than simultaneous.

The Bismarck is set in the icy waters of the North Atlantic in May, 1942, where you must either find and sink the Bismarck or, if playing the Germans, you must evade or destroy your pursuers. It is solely a single-player game and much depends on the weather. Both sides have a weather forecasting service to allow them to try to exploit the shifting storms in the Atlantic to their best advantage. Rain and snowstorms ground aircraft as well as restrict visibility for the surface forces. Naturally, the further you attempt to look ahead on the weather charts, the more dubious the information.

This game is far more arcade-orientated. You will control the battleship's guns, or the destroyer's torpedos, and there is a mini flight simulator when you launch a "Stringbag" Swordfish attack.

Tobruk will be available soon on the Amstrad and Bismarck will make its debut on the Commodore this month.



Tobruk: Set in the desert in 1942, it is a tense wargame with highly-detailed arcade sequences like this one.

Contamination: Here you are in the laboratory trying to piece together pieces of DNA to cure the latest superbug.





Pacific: Arcade adventure with a little French style. Can you get past the obstacles and dodge the beasties?

and a whiff of garlic

Conversions of both games will arrive in due course. Looking slightly further ahead, PSS has *Vietnam* and *Dogs of War* planned for Christmas-time. In Vietnam, PSS has obviously fought shy of yet more controversy on another open historical sore. It is based on an A-team-style scenario. It is a semi-arcade, soldier-level simulation, with three objectives to be attained. According to Mays "it is like Rambo but with more in the way of tactics."

Dogs of War puts you in the mercenary business. Contracts are offered for various little "jobs" – no questions asked. You choose your nice little earner, recruit a few bloodthirsty types, kit them with the necessary hardware to do the job. It is claimed to be a blend of trading, strategy and arcade games, with a strategic map level followed by an arcade sequence.

Moving from war games, another specialist market the company wants to sew up is the role-playing *Dungeons and Dragons* market. Simpson gave up chip designing at GEC, a firm which dominates the Coventry skyline, to work on his idea for *Midas*, an adventure language system. He is a Dungeons and Dragons fan and liked the way a character from one scenario can be moved to another.

Midas is planned like that, so all future Midas games will be compatible in the way in which a character's traits of strength, magical ability and constitution are recorded.

The problem with allowing a fan of the game to do the programming slowly became apparent. The project over-ran by 18 months because Simpson became opbsessed with getting the product "right", the kind of thing that would appeal to fellow role-playing fans.

The game has attracted a small but enthusiastic following, so PSS has let Simpson loose on a sequel, although Mays is determined to try to produce this one a little faster. Simpson is promising improved graphics and will use the lessons of doing Swords and Sorcery to make the new game even better, although it will retain the mystical flavour of the original.

Data compression will allow the number of maps to be more than doubled and there will also be more variety in the monsters you encounter – they even have their own names. The aim is to create a little universe in which you can do anything. The scenario is rather more complex. You must infiltrate a castle past a series of guards. Some are rebels, some will respond to bribary. If all else fails, it is back to the trusty broadsword. There are plenty of traps you must pass and there are many more weapons, spells and monsters to play with. Midas will also get on to the Amstrad.

The third game planned for the system is *Poltergeist*. It resurrects one of the company's skeletons in the cupboard. The nightmare of every software house, Poltergeist was heavily promoted but never made it to the shops.

'We used the name again as that way we might get rid of all these posters and cassette inlays'.

"It made sense to resurrect the name," according to Mays, "as that way, we might get rid of a few thousand cassette inlays and posters we have lying round the place."

Let us hope the problems of Poltergeist I do not return to haunt him in its new guise. Simpson will try to make the game far simpler than the other Midas products. "Eighty percent of the Swords and Sorcery games goes straight over people's heads. The plot is simple, you just have to go into a house, find who is haunting it and why, and kick them out," he says.

The French software scene has taken a long time to take off but PSS seems to have discovered early signs of real talent in the shape of Informatique. The first two games, *Get Dexter* and *Doomsday Blues*, have been widely-praised for their fresh new style. The cartoon-quality graphics are particularly stunning. PSS plans to convert the games to other formats and a new game is due, called *Contamination*. You have to try to save the world from being wiped out by epidemic. You start on a map of the world and, when an area of epidemic starts, you have a number of options – throw a cordon round it, follow a scorched earth policy, nuke it – unpopular with the natives – or try to cure it.

That involves going into the laboratory to design an anti-virus. You then have to perform tests to see what effects, if any, it has on the disease. Slowly you then build up a range of anti-viruses which are known cures, should the same bug appear anew.

Mays comments ruefully on the time in August, 1984 when Ocean, called Spectrum Games at the time, produced a game called *Krazy Kong*. That game was a huge hit. PSS introduced its version 10 days later and it died a miserable death. The rest is history, as Ocean went on to carve itself a huge slice of the market. Who knows, with this steady deluge of good games from PSS, it *may yet have the last laugh?*

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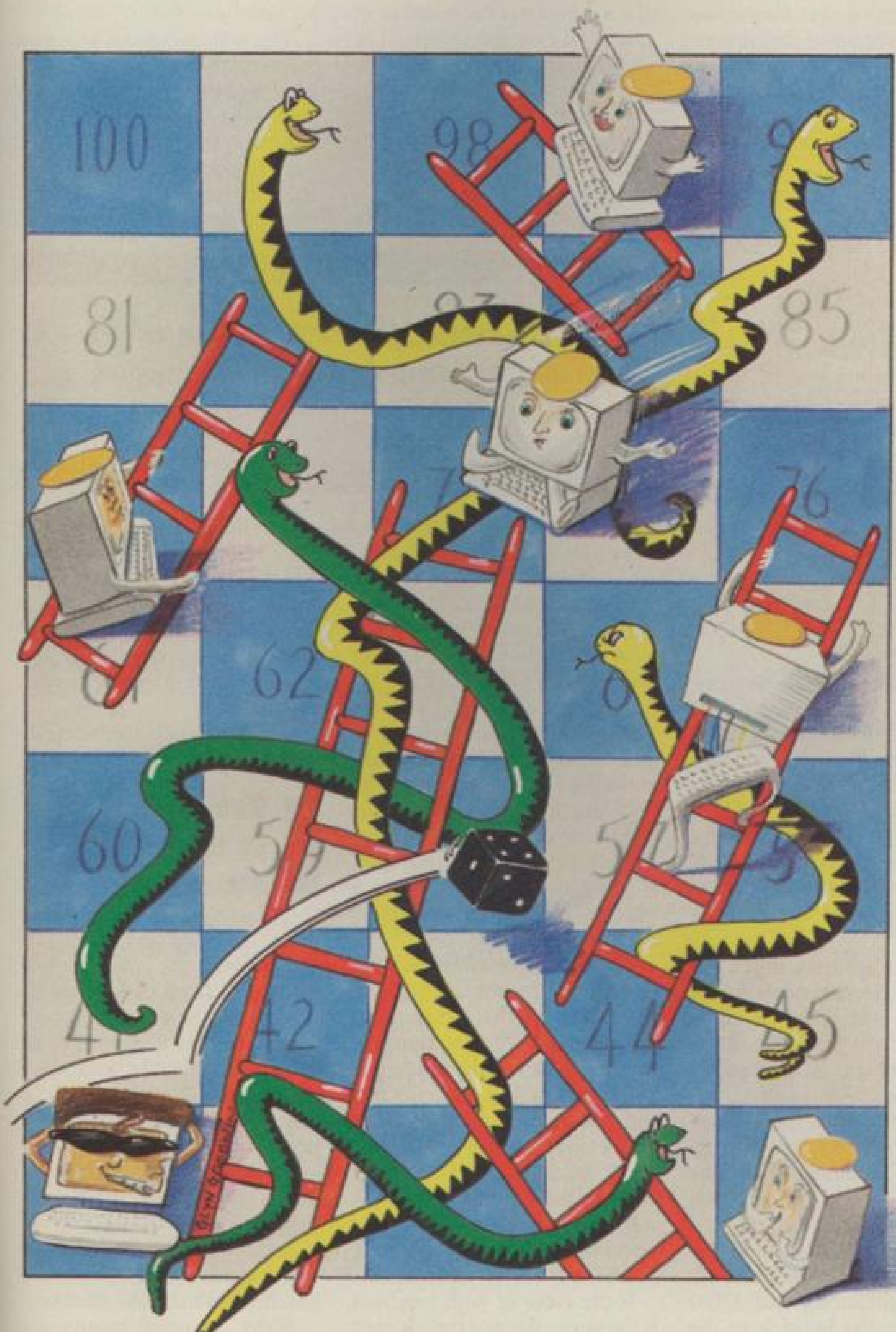
July issue on sale June 25, 1986

ADVERTISERS INDEX

Your COMPUTER COURSE

JUNE 1986

A COMPREHENSIVE GUIDE TO PROGRAMMING – PART 4



THE ART OF ANIMATION

EXPLORING COMMODORE SPRITE MANIPULATION

SMOOTH OPERATORS

LOW DOWN ON OPERATING SYSTEMS

UNSCRAMBLING COMPUTER JARGON

UNDERSTANDING COMPUTER TALK

68xxx MACHINE CODE TECHNIQUES

MANIPULATING THE BITS AND BYTES

The halfway point in the *Your Computer Course* is now past and we hope that if you have been following the first three instalments you will by now have a firm grounding in the principles and techniques of microcomputer programming.

Now is the time to build on the knowledge gained in the first half of the course and to that end we have planned a number of more advanced yet still very understandable features to take us to part six, the last issue of the *Your Computer Course*.

Now is the time to make an apology. We jumped the gun in last month's introduction. The item on programming 68xxx processors was mentioned but did not appear in the issue. We hope it was worth the wait – you can judge by turning to page 30.

Computer graphics, a continuing theme of the course, is featured again. the star this month is the Commodore 64 and the article features a program to demonstrate some of the techniques of programming with sprites.

John Lettice's Glossary continues its unstoppable way on pages 28 and 29, while the final article this month looks at operating systems. A computer's OS can make or break the hardware of a system both in terms of performance and user-friendliness, yet many people are not sure of the role that this software plays in the overall function of a computer.

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Contributors:

Ken Alexander
John Lettice
Geof Wheelwright

Commodore 64 graphics

Geof Wheelwright explores the art of graphics manipulation on Commodore's 64K computer.

One of the keys to the successful writing of any computer game is the ability to move things round and across the screen. You also need, of course, to be able to control that movement using the joystick or the cursor.

Take heart, however, as you do not need to be an expert in machine code, Pascal or any specialised language to do so. A working acquaintance with the Basic provided with your machine should provide you with all the tools you need to write a simple animated and cursor-controllable game.

The place to start is the PRINT statement. To get the simplest impression of movement or animation on-screen, type-in the following lines of program and run them:

```
10  PRINT "A"
20  CLS
30  PRINT "           A"
```

The Commodore 64 does not have a CLS command, so it employs PRINT CHR$(147) to do that job.

That simple three-line program will print the letter A in the top left-hand corner of the screen, clear the screen and then print it again a few spaces to the right of where you printed it previously. As all of the instructions are carried-out in quick succession, they create the impression of screen movement.

You will not have much fun moving the letter A about the screen – you want to move aliens, camels and the other baddies which will populate your games. To do that, you first need to design them, using the USR system for user-defined graphics on the Spectrum and sprites of UDGs on the Amstrad, 64 and BBC.

Once you have defined a user-defined graphic, the job will turn to controlling that UDG with either the joystick or the cursor keys. The first thing to remember when embarking on that task is that all the cursor keys or joystick ports do is to return a value when you push the stick or press a key.

Your job is to tie the value of that keypress to the location of your UDG on the screen. The easiest way to do it on the keyboard – we will omit the joystick for now as joystick ports work in slightly different manner on different machines – is to have the cursor position, i.e., your UDG, move up when the UP key is pressed, down when the DOWN key is pressed, and so on.

Detecting which key has been pressed is done by putting the value of the character in a string variable and then checking the ASCII value of it. If, for example, that value is equal to that of the left key, you would move the UDG one to the left.

If you intend to have some baddies to combat, you will also need to design them and write a random-number generator which places them in odd places all over the screen.

The only problem remaining is what is known as collision detection, so that when your man moves over something he wants to pick up, the micro will know that he has arrived there and will do something about it. The easiest way to do it is to check the location of whatever else you have on the screen – it will normally be an X,Y value – and seeing if it is equal to the location of your on-screen man.

If the value of both locations is the same, you will have scored a hit and your score card should be increased and the image of the baddie will be blanked-out. A little more programming will allow you to check friendly beasties against enemies, so that you would bounce off them and hit enemies.

You will, of course, also want to put a score counter in the game and that is a simple matter of adding whatever value you like every time there is a hit and then displaying that somewhere on the screen. Alternatively, you just set up a simple timer which allows you to play for a set amount of time, and accomplish all your tasks within that time, as we have done in the example.

To review, you should look at the following issues to write a game:

Design a User Defined Graphic or Sprite. To move it,

The place to start at is the PRINT statement.

print the character, clear the screen, print the character with a space in front of it, clear the screen, and so on.

To add cursor control to the program, make the location of the character dependent on the value of the cursor keys you press.

Populate the screen with other randomly-located UDG baddies.

Set up a collision detection system, checking the location of baddies against your location.

Write a scoring routine and

tie it into your collision detector.

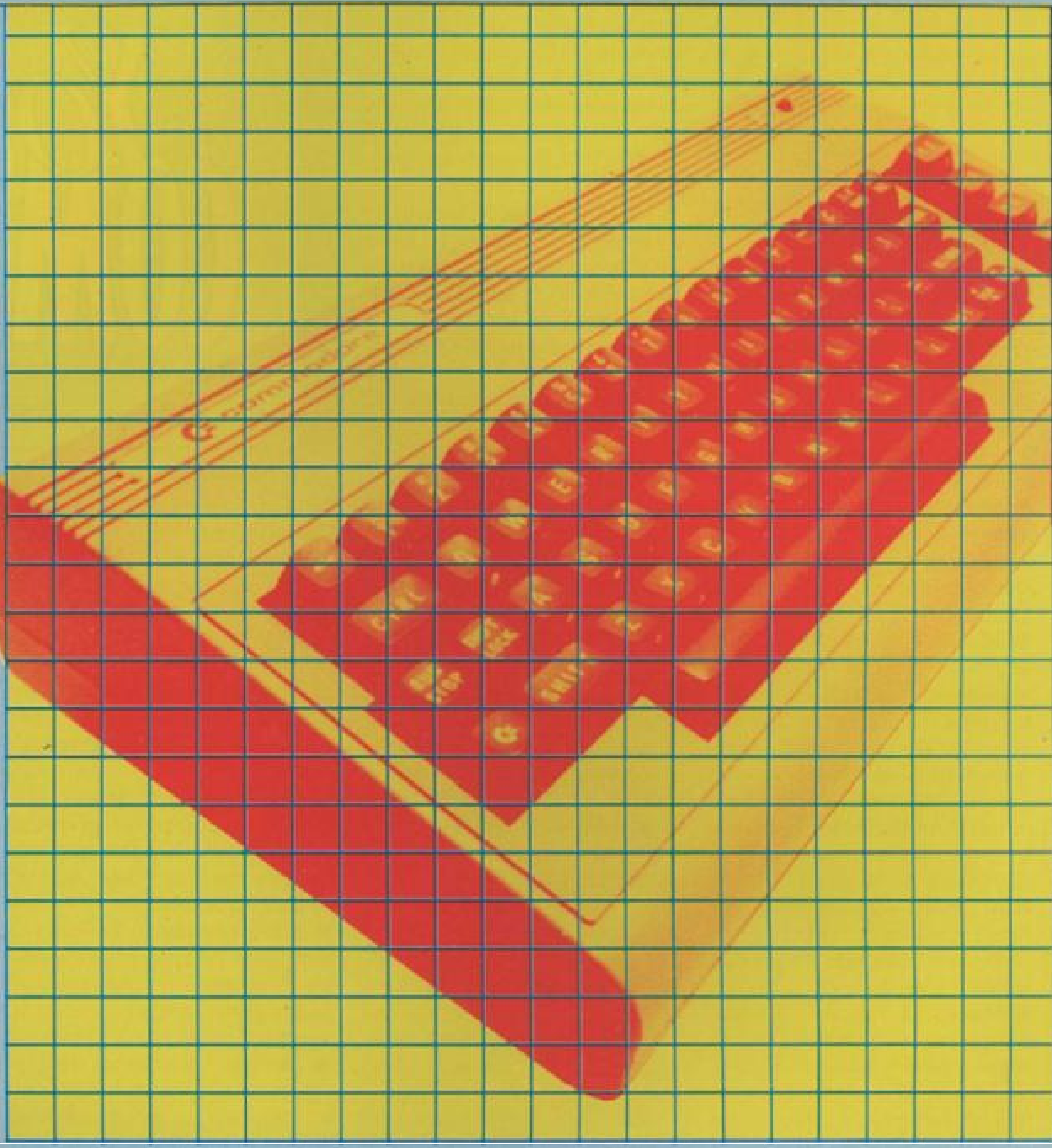
In the example program we carry-out this plan, defining the shape of a stick man on the Commodore 64, moving it across the screen and then switching into a little game where the object is to use the cursor keys to collect the little lumps of coal which populate the screen before the timer in the top left-hand corner of the screen reaches 120.

You will notice when you run the program, however, that the stick man you had originally in

The use of user defined graphics makes programming easier.

the opening screen has turned into a series of standard letters and numbers. That is intentional and designed to show how special animated characters can be made up from standard letters and numbers and to pose a challenge for you in figuring how to switch from the back into the UDGs which make up the small man.

In the next issue, we will tell you how the program can be expanded – and solve the question of switching back into UDG mode, if you have not guessed it already by then.



```
5 PRINT CHR$(147)
10 POKE 56334,PEEK(56334)AND254:POKE1,PEEK(
1)AND251
20 FOR I  0 TO 63
30 FOR J0 TO
40 POKE 12288+I*8+J,PEEK(53248+I*8+J)
50 NEXT J:NEXT I
60 POKE 1,PEEK(1)OR4: POKE56334,PEEK(56334)
OR1
70 POKE 53272,(PEEK(5322)AND240)+12
80 FOR KAR=60 TO 63
90 FOR BYTE=0 TO 7
100 READ W
120 POKE 12288+(8*KAR)+BYTE,W
140 NEXT BYTE:NEXT KAR
145 FOR L=40 TO 78
150 PRINT CHR$(14)TAB(L)CHR$(60);
160 PRINT CHR$(61)TAB(L)CHR$(62)CHR$(63)
165 FOR H=1 TO 10:NEXT H:NEXT L
170 GET A$
180 IF A$="" THEN GOTO 10
190 POKE 5322,21
200 DATA ,,,1,1,31,3,3
210 DATA 224,224,224,128,128,248,192,192
220 DATA 1,2,4,8,16,32,64,128
230 DATA 128,64,32,16,8,4,2,1
1000 PRINT CHR$(147)
1500 PRINT CHR$(5)
2000 Q=1484
2100 FOR I=55296 TO 56295:POKE I,1:NEXT I
2600 FOR U-1 TO 12:X=INT(RND(1)*1000)+1024:
POKE X,35:NEXT U
3000 FOR T=1 TO 125
3100 GET B$: IF B$=""THEN 3100
4000 IF B$=CHR$(1)THEN Q=Q+40:POKEQ-40,32:
POKEQ-39,32:PMKEQ,32:POKEQ+1,32
5000 IF B$=CHR$(145)THEN POKEQ,32:POKEQ+1,3
2:POKEQ+40,32:POKEQ+41,32:Q=Q-40
6000 IF B$=CHR$(15)THEN POKEQ,32:POKEQ+1,3
2:POKEQ+40,32:POKEQ+41,32:QQ-1
000 IF B$=CHR$(29)THEN POKEQ,32:POKEQ+1,32
:POKEQ+40,32:POKEQ+41,32:QQ+1
8000 POKEQ,60:POKEQ+1,61
8200 POKEQ+40,?:POKEQ+41,63
9000 PRINT T:PRINT CHR$(19):PRINT CHR$(32):
NEXT T
9500 PRINT CHR$(147)
900 POKE 53272,21
10000 FOR G1 TO 23
11000 PRINT ".................TIME IS UP....
........"
12000 NEXT G:GOTO 10000

READY.
```

Your COMPUTER O

John Lettice continues his guide to computer jar —
from machine code to programmi lar



■ **Machine code:** The language a computer understands, i.e., binary coding. Also known as machine language but in terms of comprehensibility code expresses the full flavour.

■ **Machine independent:** A language, program or process which is not tied to a particular machine is machine-independent. Not to be confused with a machine you cannot control, which is an independent machine.

■ **Machine instruction:** A set of randomly-generated irrelevancies, entitled Manual, and with the apparent objective of encouraging you to buy the Advanced User Guide accompanying your shiny new computer. Alternatively, a particular instruction encoded in machine code/language.

■ **Machine language:** Expletives generated by the behaviour of a given machine. Otherwise see **Machine code.**

■ **Macro:** A micro is a small computer, so computers being about logic you would expect a macro – it's Greek for big – to be a big computer – circuits like tramlines, wrought iron logic gates, that kind of thing – but you would be wrong. It is a sequence of instructions pre-programmed to be called as one unit, so if it goes "do this, do that, do the next thing", all three instructions can be called by the name of the procedure.

■ **Macro-assembler:** An assembler used to build macros.

■ **Magnetic bubble memory:** An expensive form of memory which draws little current. Now largely superseded by CMOS. See **CMOS.**

■ **Magnetic media:** Any form of storage based on the magnetic state of the medium used. Also specialised newspapers dealing with magnetism, most famous being the now-defunct *Magnet*.

■ **Mainframe:** A large but practically indefinable computer, as micros trespass on the territory of minis and minis similarly poach on mainframe territory. Originally mainframes were large, powerful computers, but they are now best defined as any large computer where the gubbins is contained in a steel frame.

■ **Main memory:** The part of a computer memory which can be accessed directly by the main processor, as opposed to external storage or memory configured to behave like external storage.

■ **Mantissa:** A kind of Spanish dance. Also the part of a number to the right of the decimal point.

■ **Mask:** A piece of hardware used by designers of failed computers for protective purposes. Also a method used to prevent the CPU being interrupted by an external device.

■ **Mass storage:** An external storage device, usually a hard disc, but could be a floppy disc, depending on your concept of storage. True mass storage is, or course, a hard disc used by a priest.

■ **Maths:** A discipline thought by the ignorant to be endangered by technology but those in the know realise it is even more important nowadays. See **Floating point arithmetic.**

■ **Matrix:** A table of numbers. Multiplication tables are an example of a two-dimensional array but they can also be of three, four or whatever dimensions. Many programs fail to work because their arrays are of "whatever" dimensions.

■ **Matrix printer:** See **dot matrix printer.**

■ **Megabyte:** One million bytes, which is, in today's terms, a grossly inadequate amount of memory. Business computers used to operate satisfactorily with 64K but now they need 512K just to generate a syntax error.

■ **Memory:** Disc storage is also technically memory but the term generally is used of the volatile memory on board a computer.

■ **Memory bank:** A bank of memory connected to the CPU in tandem with one or more other banks, allowing the CPU to switch between them.

■ **Memory dump:** The computer graveyard, or a printout of the contents of a computer memory, usually used in an emergency where the contents of memory must be reconstructed later.

■ **Memory map:** A chart issued by the manufacturer to confuse you about the functions of the various parts of a computer memory.

■ **Menu:** A series of options displayed on-screen by a program, e.g., 1, Edit; 2, Print; 3, Cod and chips.

■ **Menu-driven:** Meals on wheels or a kind of program which allows you to control it by moving from one list of options to another.

■ **Microcomputer:** Literally a very small computer but in reality a computer so compact and inexpensive that almost everyone can be annoyed by it.

■ **Micron:** A unit of length which equals one-thousandth of a millimetre. Based on the Greek-derived prefix micro, meaning small, it is apparently a very small 'n'.

■ **Minicomputer:** A small mainframe, a large microcomputer, or something in between . . .

■ **Mips:** A measure of computer speed, in millions of instructions per second.

■ **Mnemonic:** An abbreviation selected to help you remember something and used in assembly language programming to help define what a given instruction is doing.

■ **Mode:** Some computers can be switched between, say, graphics mode, text mode and so on.

■ **Modem:** Short for modulator/demodulator, a device used to convert a computer signal to and from an audio signal for transmission on a telephone line.

■ **Modular:** A way of building a system whereby blocks can be slotted in at a later date. Used by manufacturers to allow them to supply parts late.

■ **Monitor:** A kind of program used to oversee the functions of a computer, or a TV-like display used with a computer.

■ **Most significant bit:** The bit the manufacturer omitted from the box, or the left-most bit in a binary number.

■ **Motherboard:** A breadboard is something you use on which to cut your bread, so a motherboard is the main circuit board of a computer. Well, what did you think it was?

■ **Multi-dimensional array:** An array of more than one dimension and generally of one more dimension than that of which you can easily keep track.

■ **Multiplexor:** An item of body-building kit, or a device which allows two or more signals to share the same wire. Sometimes abbreviated to MUX.

■ **Multi-tasking:** A kind of computer which can perform more than one task at the same time. The ability to have a funny flickering on the screen and a smell of burning emerging from the main unit does not count as multi-tasking.



COURSE

jarg n – this month he moves
amin language.

■ **Nanosecond:** One-thousandth of a microsecond, or one-billionth of a second. Named in honour of Sir Herbert Nano, inventor of the cuckoo clock.

■ **Nesting:** Having one or more routines inside another, e.g., nested FOR . . .NEXT loops. A technique used for storage of parts in Sir Herbert Nano's first factory.

■ **Network:** A group of computers linked through communications. Because of the difficulties involved in connecting a working network, the similarity to "notwork" is not necessarily coincidental.

■ **Nibble:** Four bits, or half a byte.

■ **Noise:** Interference on a – generally communications – line. Generally less obvious than "'Ere, what's that 'orrible shrieking noise?"

■ **Non-maskable interrupt:** An interrupt which cannot be masked. See **mask.**

■ **Non-volatile:** Obsolete term meaning a British micro company which is not going out of business, or a storage device which retains its data even when the power is shut off.

■ **Null:** Zero, or an electrical signal defined as zero. Now you know what "Norway, null points" means.

■ **Null string:** A string which contains no characters.

■ **Number-cruncher:** A term used of a large computer used predominantly to perform large numbers of calculations and to send bills for 0.00 pence.

■ **Numeric:** A number, or an operator such as +, –, used with numbers.



■ **Object code:** The code output of an assembler or compiler.
■ **Obsolescence:** From the manufacturer's point of view, the most important component in your computer.
■ **Octal:** A numbering system using the base eight. Used by heavy programmers as shorthand for binary but otherwise of no use to man nor beast.
■ **Off-line:** Not connected – a micro which is not connected to a mainframe is off-line.
■ **Ones complement:** A binary number produced by reversing the ones and zeros in the original number.
■ **On-line:** Two devices connected to one another are on-line.
■ **Opcode:** Often used as an alternative to machine code – short for operation code.
■ **Operand:** A word or number operated on logically or arithmetically.
■ **Operating system:** A group of programs put together to give a computer its personality and allow it to work. It is not clear why the latter part seldom becomes true. Commonly abbreviated to O/S.
■ **Operator:** A mathematical or logical symbol, e.g., +, used to represent an operation between variables or constants.
■ **Optical character recognition:** The identification of characters by a scanner connected to a computer. If computers could read properly, there would be no need for filing cabinets. Obviously they can't – yet.
■ **Output:** Information produced by a computer and sent to an external device. See **Error message.**
■ **Overflow:** What happens when a calculation exceeds the size of the register containing it. If you imagine dirty bathwater slopping around inside your computer you will get completely the wrong idea.
■ **Overlay:** A method of programming which uses the same area of memory at different times by over-writing parts of the program no longer needed. That is why flasher applications look as if they are dying at regular intervals – they are re-writing themselves.



■ **Package:** Term used by the software industry to describe a program, no doubt deriving from the most costly part of the finished product.
■ **Packet:** A batch of transmitted data.
■ **Paged memory:** A method used to switch areas of memory in an out of the CPU address space.
■ **Pagination:** The technique whereby continuous stationery of 72 lines per sheet becomes 73 lines per sheet when you set your word processor for 72.
■ **Palindrome:** A binary number which reads the same from left to right and from right to left.
■ **Parallel:** A kind of interface where the signals move side by side, or in parallel, rather than in-line, in serial.
■ **Parallel processing:** A computer system capable of doing two or more things simultaneously is capable of parallel processing.
■ **Parameter:** A variable entered from one part of a program into another.
■ **Parity:** A method of checking for error in data communications, where parity is set either at odd or even.
■ **Parse:** To separate a string into its parts before attempting to understand it. Parsers are used in adventure programs to simulate understanding on the part of the computer.
■ **Pascal:** A high-level language much favoured by the Campaign for Real Programming (CARP). See **Techie.**
■ **Pass:** A single run through a program or subroutine.
■ **Password:** Often used in networks or multi-user systems to protect the individual's data. Passwords are in two categories – easy-to-remember ones which anyone can guess and difficult ones you can never remember. There is no middle ground.
■ **Patch:** A small amendment to software "patched-in" to a main program to correct errors.
■ **PCB:** Printed circuit board.
■ **PEEK:** Basic command used to return the value present at the address PEEKed.
■ **Peripheral:** An extra which is controlled by, but not part of, a computer.
■ **Pin-out:** The layout of the connections in a circuit or plug.
■ **Pixel:** Picture element, the smallest component of a computer display.
■ **Plotter:** Member of a group of manufacturers trying to carve up IBM, or an output device which uses pens to draw graphs and diagrams. Cheaper variants sometimes double as printers.
■ **POKE:** Basic statement used to POKE a value directly into a memory location.
■ **Port:** A connector used for I/O to printers and the like.
■ **Portability:** Imaginative term used by software manufacturers who claim their software can be transferred easily from one machine to another.
■ **Printhead:** The part of the printer which transfers the image to paper.
■ **Printout:** The hard copy produced by a printer.
■ **Procedure:** Often used interchangeably with subroutine.
■ **Program:** Any list of commands which can be stored – even if only in RAM – is a program. It need not, and often does not, work.
■ **Programmer:** In Darwinian terms, somewhere on the evolutionary scale between artichoke and three-toed sloth.
■ **Programming language:** A set of terms understood by the computer and programmer to have a common meaning.

First steps with 68xxx machine code

David Janda introduces the basics of 68xxx machine code programming which in many respects is more straightforward than eight bit coding.

any people are deterred from the idea of learning machine code because it takes a great deal of effort to do even the simplest things. Take a simple task such as multiplying two small numbers; it can be a real problem for the beginner in machine code and it is understandable when learners are frustrated.

The reason even simple tasks take up much time to code is because of the way the central processing unit is designed. Most home micros use one of two CPUs, the 6502 or Z-80. They are 8-bit CPUs, meaning that the CPU registers can hold values up to eight bits in length. That is 11111111 in binary which is 256 in decimal. The CPU native instructions are also very simple; operations such as add, subtract and load are about as complex as you will get in an 8-bit machine. Z-80 programmers are lucky insofar as they can double-up registers, thus permitting them to be used to store larger values. So register B and C can be regarded as a register pair BC. That will allow BC to store a 16-bit value which is 1111111111111111 or 65536 in decimal. Even that is not good enough for some applications.

As more and more computers are made, the cost of developing components falls. That means that more and more memory is available at cheaper prices. That is also true for CPUs. The 16-bit CPU which is used in the business end of the market extensively is now becoming available to the home user at realistic prices.

There are two machines available to home users which use the 16-bit 68000 CPU, the Sinclair QL and the Atari 520 ST. Those machines are more powerful in processing terms than anything previously available and that can be attributed to the design of the 68000. The 68000 is a 16/32-bit CPU which was designed by Motorola. There are four chips in the 68xxx family – 68000 as used in the Atari ST range; 68008 as used in the Sinclair QL; 68010; and 68020.

The difference between them is the size of the data bus which is used to fetch and store data to and from memory. All have an internal 32-bit architecture but in the case of the Atari ST the data bus is only 16 bits wide and on the




```
The eight data registers

31                                0
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX D0

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX D1

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX D2

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX D3

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX D4

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX D5

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX D6

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX D7
```



Sinclair QL eight bits wide. In practice, that means the 68008 running the same program as the 68000 would do so, but somewhat slower.

Unlike its 8-bit counterparts, the 68xxx series has plenty of registers – 19, all except one 32 bits long. The first set of registers are eight data registers which can be used like variables. Having eight data registers is useful as it permits a programmer to jiggle about with data without having temporarily to store it in main memory, which is time-consuming. Those registers may be used for arithmetic and logical operations. Four types of data can be used with this type of register – individual bits, 8-bit bytes, 16-bit words and 32-bit long words. That means, for example, that a program could work with four 8-bit characters held in one data register at the same time.

The data registers can also be used to manipulate whole signed integers within the range +2,147,483,647 and –2,147,483,648. Because programmers will not use the full 32 bits, the majority of arithmetic operations can work only on part of a data register. A byte operation uses only bits zero to seven of the data register. A word operation uses bits zero to 15 and some arithmetic operations can use all 32 bits.

The next set of registers to consider is the address registers. They are used mainly to point to areas of memory where blocks of data are stored, such as arrays, character strings and so on. There are, however, some arithmetic operations which can be performed on this set. Register A7 is rather special insofar as it holds the stack pointer value. There are two A7s, one used for the user stack pointer and the other the system stack pointer. That is because the 68xxx series can run in two states, system and user.

The 16-bit CPU is now widely available to the home user at realistic price levels.

The final two registers are the Program Counter and the Status Register. The PC is used to keep track of the address of the next instruction to be executed. The SR records the status of certain aspects of the last operation performed. That information can be used to decide whether to jump to a subroutine, exit a subroutine and so on.

The 68xxx series has about 57 basic instruction. Instructions which are found on many 8-bit CPUs are included – Addition – ADD; subtraction – SUB; jumps, moves, branches and bit manipulation. What is not common to 8-bit micros are instructions for multiplication, MUL; and division, DIV; and, of course, MOVE. The ability to step through a program one instruction at a time is standard with the 68xxx series.

68xxx code can be more compact than eight-bit programs.

The MOVE instruction is very versatile and can be used to move data to and from memory or registers. It can be used in the form MOVE.W which means that the data to be moved is a long word – 32 bits. MOVE.W on the other hand means that the data to be moved is 16 bits long. Here is an example:

MOVE.W $21232,D1

Move the 16-bit value stored at address $21232 into data register D1

That is absolute addressing; $21232 is not an offset of another address – it means address $21232.

To perform the opposite, that is store the contents of D1 into an address, the following could be used:

MOVE.W D1,$32767

Move the 16-bit word stored in D1 into the address at $32767.

Addition is equally simple. ADD.W $26352,D3 would add the contents of address $26352 to that already stored in register D3. SUB and MULT can be used in a similar manner, and immediate addressing is just as easy to grasp, the point being that with the 68xxx series it is feasible to write a program in machine code which performs a mathematical task which would need much more code on an 8-bit machine.

```
The nine address registers

31                                0
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX A0

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX A1

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX A2

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX A3

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX A4

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX A5

 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX A6
          user stack pointer
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX A
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 7
       supervisor stack pointer


END
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Operating Systems – a key role

Behind every great micro is a good operating system. Ken Alexander explains the importance of a computer's OS.

Every schoolboy knows the difference between computer hardware and software; hardware hurts if you drop it on your foot, software does not. Where does firmware fit into this simple view of the computer? Well, it could be said that firmware would hurt if dropped on certain parts of your anatomy – but not much.

Joking aside, though, firmware, in the form of a resident operating system, plays a vital part in the function of any computer. The *Your Computer Course* has in recent months explained how computers may be programmed both in high-level, interpreted languages and in low-level machine code, the native tongue of the microprocessor at the heart of the computer. Whether programming in high- or low-level languages, there is another essential program working away in the background – the computer operating system.

The major function of the operating system is to take care of what are termed housekeeping functions in the jargon of computing. Despite John Lettice's entry in the course glossary, housekeeping does not mean that computers do the washing before they go to work – at least not yet.

Housekeeping tasks include such operations as collecting data from the computer keyboard, displaying output on the system VDU, controlling the operation of any serial or parallel input/output ports and taking care of the saving and loading of data to a mass storage device, be it a cassette recorder or disc drive. When programming in a high-level language, all those operations are taken for granted and, even at machine code level, in general programmers will pass data to a routine within the OS when they wish to do so – for example, input or output data from a program.

When designing a computer system, manufacturers have an important choice. Either they can write an in-house OS or they can opt for an existing system and tailor it to their machines. Many home computers of an early 80s vintage have their own OS; such machines include the Spectrum, CBM 64 and BBC micro.

The disadvantage with manufacturers' own-brew operating systems is that a program written for any one machine can be used only with that particular computer – the software is not portable. The trend in more recent times, though, is for an increasing number of eight home computers to adopt one of the best-known operating systems, CP/M. CP/M software is portable thus, at least in theory, a CP/M program written for, say, the Amstrad CPC6128 will be able to run on the Commodore C128, as both machines support CP/M.

The trend in future will be for every micro to support at least one industry standard OS – CP/M for eight-bit machines, Gem or PC-DOS for 16-bit designs.

Given that the architecture of any two computers can be very different, how does an OS manage to achieve the portability of software? The secret is in the fact that any operating system consists of a kernel program which manages the system memory and the way it interacts with the processor. Any computer which supports a particular OS must conform to given standards in this area. It is the way in which I/O is handled which gives the OS its portability.

The major function of an operating system is housekeeping.

Essentially, an OS adopts what is generally termed a device-independent approach to input and output from a system. That means that the operating system will treat all I/O to a particular class of device – VDU, keyboard or disc drive – in an idealised way. That takes no account of the particular requirements of the device in a 'real' computer. The trick is that any manufacturer wishing to use the OS on its hardware writes a small piece of code which translates the flow of data to and from the OS's ideal I/O driver and translates it into a form which can be accepted by the physical device on its computer.

Installing an OS, then, given that the design of the memory and processor meets certain standards, is simply a matter of writing a series of I/O drivers.

The trend in future will undoubtedly be that all computers will support at least one industry-standard OS. For 8-bit micros that will be CP/M; in the case of 16-bit hardware the choice of OS will depend on the computer CPU. 68000 hardware will adopt Gem while PC-DOS is the standard for machines built round the Intel series of MPUs.

Soft systems

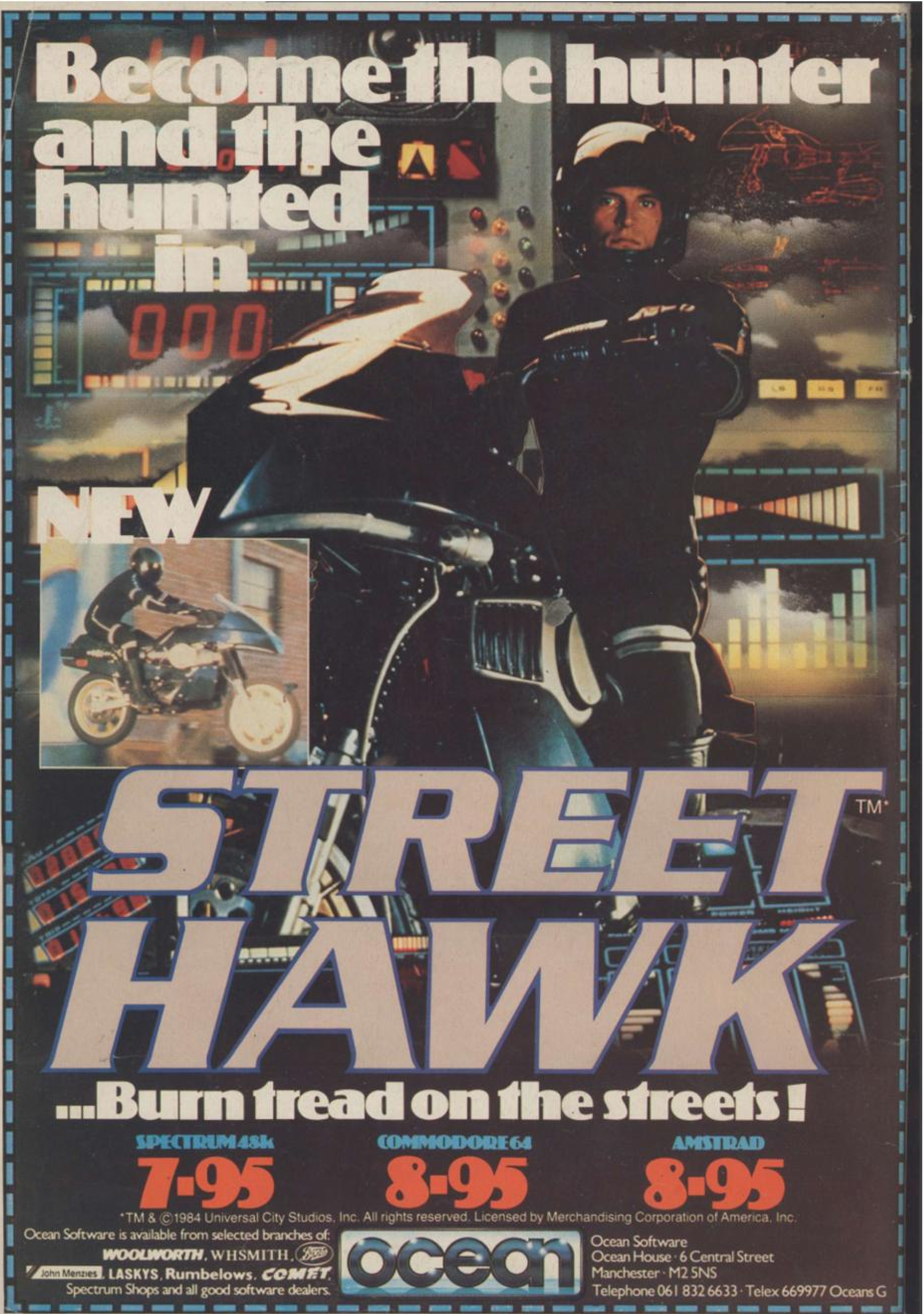
While in the main article it is assumed that a computer operating system is supplied as part of its firmware, there is an increasing trend towards supplying the OS as disc-based software. The leading example of that approach are the Amstrad PCW computers.

The CP/M Plus operating system which forms part of the bundled software supplied with those computers is provided on a 3in. floppy disc – the computer contains no resident operating system. If there is no OS, the software which controls all a machine's I/O, how then does the PCW computer manage to laod CP/M from disc? The answer lies in the fact that there is a small program resident in the machine, although it could scarcely be described as an operating system.

It is a bootstrap routine, its job being to load the first few bytes of data from the computer disc drive – that code is the core of the operating system and soon takes over control of the system from the bootstrap routine.

The supply of a machine's OS as soft, rather than firmware, has a number of advantages to manufacturer and user alike, the main advantage being that it is a simple matter to issue upgraded versions of the software. It has the disadvantage that the OS occupies an amount of computer RAM, although as the memory size of each new generation of computers continues to increase, that is no longer a serious handicap.


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